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843
842
No. 2323

United States
Circuit Court of Appeals

For the Ninth Circuit.

Transcript of Record.
(IN FOUR VOLUMES)

LOUIS MASON, L. O. CLARK, JOHANNA
FARLIN, C. C. CLARK, L. P. FORES-
TELL, A. F. BUSHNELL, JOHN DOLAN,
PAT LEROUS, J. T. FITZGERALD, and
ELIZABETH BROWN,

Appellants,

vs.

WASHINGTON-BUTTE MINING COMPANY,
a Corporation,

Appellee.

VOLUME III.


(Pages 833 to ~~1290~~, Inclusive.)

1524

Upon Appeal from the United States District Court for
the District of Montana.

FILED

DEC 4 - 1913



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Records of the S. Circuit
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NO. 2353

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(Testimony of Samuel Barker, Jr.)

If you are assuming that a vein shown at different places is one and the same vein, and not different veins, you would consider the physical characteristics of the vein. One of the things to be considered would be the width of the vein and the extent of the mineralization. There are others. If there was a very great difference in that respect, that would tend to lead to the conclusion that they were not portions of the same vein,—that is, a dissimilarity of physical characteristics would argue against an identity of the vein.

The Rabbit discovery is a small vein; I think I testified about six inches in width, but in that case I took the dip and direction of the vein, and the kind of material in that vein, in forming my opinion. You could easily find parallel fissures with a similarity of certain physical characteristics. For [623] instance, I can find them in the silver belt. I can find any vein similar to the other veins. I should not say that you might reasonably expect north of the veins shown in the tunnel 31, another vein with a northerly dip and carrying chrysocolla. That is a peculiar condition here. It dips north. All of our veins dip generally to the south. That is one of the characteristics there that leads me to believe that that was at one time a portion of this same easterly and westerly fissure. I only find one northerly dipping vein in that ground. I am assuming that there is only one north dipping vein in that property, and in that north dipping vein I find the conditions which lead me to believe that before the

(Testimony of Samuel Barker, Jr.)

faulting it was one and the same thing. There is not sufficient development work there to show that there was not another north dipping vein.

The vein shown in the Vesuvius cross-cut dips to the north and has an easterly and westerly strike. It is represented on the map here, Defendants' Exhibit No. 1. The drift represented is on the vein; it is a drift south from the shaft marked Vesuvius discovery; that drift has a slightly northeasterly course. That was the course of the vein there then, slightly northeasterly, having a north dip. The strike of the vein there is a very few degrees different from the strike which I have assumed for the vein in the Rabbit discovery.

I brought a sample of rock which has been marked Defendant's Exhibit No. 74, that I obtained from the west side of Main street, in front of the Federal building. That has a greenish color; it both has a stain by copper and a replacement. The conditions existing where I found that sample was where the pavement of Main street has been removed at the point in question, and underneath that the solid rock was uncovered and an opening made into that solid rock, and this piece is from that [624] excavation, in the solid rock. The solid rock is granite. I should say it was vein material, in a vein. As to its having any definite boundaries, I do not know what that excavation shows, but on both sides of it, it shows practically the same replacement. The excavation does not prove how extensive the deposit is. On the west side of Main street, as I testified this morning, I have

(Testimony of Samuel Barker, Jr.)

seen that same copper in the granite, and it extends as far south, I think, as what is now Mr. Murray's bank. I think it is a secondary deposit; I think that the mineralization would come from mineralized waters that are later than the original vein formation. I think a portion of the mineralization came from ascending, and a portion of it from descending waters, and I also think that the faulting which is parallel to what is known as the blue vein fault in this vicinity has had something to do with this mineralization. I think that this sample, Defendants' Exhibit No. 94 was mineralized partially by ascending waters and partially by descending waters, and that mineralization coming from this fault that is practically under this Federal building,—practically as we have the mineralizing waters enriching the rock in the ground in controversy by the continental fault and other parallel faults. When I speak of descending waters I do not mean surface waters,—water that has its source in rainfall and snow,—not altogether, because this rock we now see on the surface of the earth was probably covered for a great distance when the circulating waters mineralized, and what I mean by descending waters would be waters that had gone out laterally on each side of the vein, taking into solution the copper that is found in the country rock, and bringing it back into these vein fissures, which would then constitute descending waters. I do not know in what form the copper in the granite in the Daly monument is. I know that the folio says that pyrite is formed in [625] what

(Testimony of Samuel Barker, Jr.)

might be termed fresh granite,—that is, granite far removed from the mineralizing agencies of Butte. The copper would be chalcopyrite, if you had the true form of it. I do not know that it is a form of copper that becomes soluble when exposed to the air and water, and dissolves in water when exposed to the air. I never saw it. I should not think it would, in what we have as ordinary water now. As to knowing that it does, from having seen it in the tailings dumps and dumps from the mines,— that is copper sulphate. There is some that after the granite reaches the air, there is a certain amount of lime in it, and the pressure has been removed and it breaks up and the sulphide is attacked by the oxygen of the air, and also by surface waters.

Q. And in the ground in controversy in this case, copper that was gathered up by the surface waters and then redeposited, would be deposited indiscriminately, wouldn't it, both in the cracks and in the faults and in the veins, and in places as a mere slight coloring of the granite?

A. Well, I agree with the whole of the question excepting the last few words. I say it is a replacement instead of a coloring. Of course, the rock is colored, but I say the mineralization has effected replacement. The action that has taken place is a replacement but the result is a very slight discoloration in certain instances, of the granite. The sample that I brought in, marked 94, is an example of very slight discoloration.

Q. Well, if the ground in controversy was mineral-

(Testimony of Samuel Barker, Jr.)

ized in this way, the presence of the fault has nothing to do with the deposit of mineral,—that is, the secondary deposit of mineral, in the vicinity of the Hornet shaft?

A. I certainly think that the continental fault, and some of [626] the other faults found there, had a great deal to do with the secondary enrichment of the rock mass, and also the secondary enrichment of the vein itself, or the crack that you now call a fissure. It has to do with it as it afforded a channel for the circulation of the waters and those waters were mineralized. I did not say that this secondary mineralization came from copper that was gathered up from the country rock generally; I said that that mineralization came in part from ascending waters which would be allowed free circulation because of the fault that is found there. I did not say that the secondary mineralization was due to the descending waters; I said both—I think that there was mineralization along the fault by ascending waters along this continental fault. As to your question why it was not mineralized along its entire distance—as far as I know, it is mineralized wherever I have seen it. For instance, in the Butte and Bacorn, three miles from this ground, the mass between the fault planes is more or less mineralized. The mineralization in the fault being due to ascending waters, I would expect that mineralization to continue down to great depth; and I am venturing the opinion that when deep development is done on the Butte and Boston and Bullwhacker and Montgomery, that rich sul-

(Testimony of Samuel Barker, Jr.)

phide ores will be discovered, such as are now being worked on the Pittsmon't. Assuming that it was due to descending waters, and without any other agency than descending mineralized solution, the mineralization would cease somewhere's at depth. Now, it depends on the period through which mineralization occurred,—that is, I mean now the great mineralization. I do not mean such as is going on to-day,—and also the size of the cavities through which that mineralization could be effected, how deep seated they were. They might have gone down thousands of feet, for all I know. The cracking of the ground in the vicinity of the ground in controversy by [627] numerous parallel fissures, and the east and west cracks in the granite, has not caused a more or less superficial deposit of mineral from the circulation of the surface waters that I know of. The developments do not prove that to me yet.

Q. Well, whatever deposit of mineral there is, by the action of surface waters, would be of that nature,—that is, it would be distributed over a large area of country, when you take into consideration the numerous small fractures and the east and west cracks of granite due to those fractures?

A. Yes, there would be greater mineralization along the line of fault. It is proven absolutely in this ground, because in tunnel 36, you cannot show me any green staining at all in that granite, and yet in the Hornet tunnel, I find that the granite has been mineralized. There are a great many cracks there. And it is possible that to the north of tunnel 36, you

(Testimony of Samuel Barker, Jr.)

might find the granite mineralized there, along what I think is the line of vein. As to those cracks which are in the granite connecting with the faults, are more or less superficial,—that, of course, is theorizing again. They might go down a short distance, or they might go down a great distance. Of course, we have the immense, or the great continental fault, and therefore I should say the fissuring occasioned by that fault would be deep seated, rather than otherwise. It might be the case that there are many east and west cracks that are entirely superficial, but the developments out there have not proven or disproven anything of that sort. I should say that some of the fissures caused by those cracks are very small indeed, while others would be greater in extent.

Q. And the result of the condition, is a more or less superficial deposit of the copper over a large section of the country. Isn't that true?

A. Of course, from the shallow workings that we now have on [628] the ground, that might be assumed, but the deeper workings such as in the Bullwhacker, prove to me that the contrary is the case. As to the resultant condition being a more or less superficial deposit in many places,—it would depend absolutely on the depth of the fissures occasioned by the faulting through which that mineralization could be effected, that we have out there.

As to there being some cracks in the granite caused by the faulting, I saw no evidence of such cracks, but I think that the ground, when the faulting occurred and the subsequent parallel faultings came about,—

(Testimony of Samuel Barker, Jr.)

was cracked or it was broken and it allowed the freer circulation of mineralizing waters. In the granite cracks it was cracked along the joint planes sometimes, for short distance, but where you had such a strain set up in the granite as there must have been between those faulting planes, it would follow along the line of least resistance, and it would reach from one to the other, which would be in an east and west direction. They would be a fracturing of the granite. I do not know whether chrysocolla is insoluble. The fact that it is there in the oxidized zone and has been there for a long time, does not prove to me that it is practically insoluble.

Q. Well, if it was soluble, the action of the surface waters would have carried it away, would it not?

A. Well, I doubt not. Right to-day you could force solutions through the chrysocolla in this district and then upon chemical examination, you would find some copper in it. I think some copper would be taken into solution. The water forced through it would be under high pressure and very hot indeed, practically in the form of vapor. I do not think it is soluble in water at ordinary temperatures and pressure; though I [629] have never tested it for that. As to whether there is very much of the copper that is scattered or distributed through the granite there that has come from the chrysocolla in the veins, I do not know. The mineralization that you now find in the granite or which was originally granite, has come, I think, partially when the—or come about partially when the mineralization was taking place in the vein

(Testimony of Samuel Barker, Jr.)

fissures, and I think thereafter that, because of the faulting, the vein fissures were greatly enriched and some of the mineralizing solutions went through into the wall rock, or the granite, enriching that and making it contain more or less copper. It is my theory that there has been a secondary mineralization, and that that mineral has come from the granite. I stated I did not know the extent of the deposit of the copper in the place that the sample, Defendants' Exhibit No. 94 came from. I admitted that the excavation itself does not show the extent of the mineralization, that is, the wall between the mineralization and the unaltered granite. About thirty or forty feet west of the point from which sample 94 was obtained I saw chrysocolla. I do not know whether the deposit of copper was continuous between the two places. They were both veins, both of the places where I saw chrysocolla. I do not know how rich the deposit was; I should say it was mineralized rock in place. My understanding is that the amount of money which you could get out of the rock, is not the deciding feature as to whether it is the vein or not. It does not have to be of such value that you could treat it or not, in order to be a vein. The question whether it is a vein, does not depend on either the depth or extent laterally of the deposit. The feature is the mineralized rock in place, however small.

I stated that the probability of there being veins in the Pittsmont ground depended on the fact of an east and west vein [630] in the Silver Bow claim, which laid to the west of it; that was before any oper-

(Testimony of Samuel Barker, Jr.)

ations were carried on in the Pittsmont. That is before it was acquired by the Pittsburg and Montana Company. In order to determine the place to look for the vein in the Pittsmont ground you would project a line for the strike of the vein some place to the east. You would also take the strike some place where it was actually developed west. If you had the strike of the vein in the Silver Bow ground, and projected a line along the strike into the Pittsmont ground, you would not expect the vein along that projected line exactly,—not within a foot or two, or may be ten feet, because veins do not run in absolutely straight lines. If you projected it over there a thousand feet, if the vein continued without faulting, I would expect to find it within a few feet, for the reason that the vein on the west side where it was already developed was very straight indeed,—that is, it was not irregular as to strike. As I remember, it had a uniform strike for a certain distance to the west. In the J. I. C. to the Glengarry the strike was pretty uniform. I know of fissures in the camp that are uniform in their strike for quite a long distance, and then depart from that strike very much. The Rainbow vein, one of the largest fissures in Butte, is an example of that kind. When I say I would expect to find this Silver Bow vein within a few feet of the projected line, I do not mean a hundred feet or a few hundred feet; I should say within the limits of thirty or forty feet, and, of course, that was proven by the work done on the Pittsmont. If you did not find it in sinking a shaft along the line of the projection, you

(Testimony of Samuel Barker, Jr.)

would have to follow out on the course projected on the line, and then cross-cut it for your vein. If you knew the dip of the vein you could sink off to one side, where there would [631] be little doubt but at depth you would cut the vein on its dip. The vein might vary or it might not, quite a good deal on its strike. It might be that it would be dislocated by faults. In the western part of the Pittsmont ground the probability of dislocation by faults was slight; there were no known faults determined at that time, or known at that time, because there was not any development. If there had been a large fault within the limits of the ground, undeveloped, there might and there might not be indications of it in the parallel fault over in the Silver Bow ground which had been developed. The absence of any conditions such as that was not one of the things taken into consideration in determining the probability of finding a vein over in the Pittsmont ground. That was not the case at all. The case was that Mr. Donald Gillis and Malcolm McDonald, who had the options on the ground, went solely on the proposition that there were faces of good ores showing on various levels on this vein upon the Silver Bow, and that is what sold the ground. There was no probability of faults or anything else. The western part of the Pittsmont ground was not very different from the ground in controversy in reference to faults, because they have found several faulting planes running parallel to the continental fault, and those that are in the ground in question, by the workings that are now done in the

(Testimony of Samuel Barker, Jr.)

Pittsmon't ground. They dislocated the vein.

Q. Then the projected line,—that is, the line projected on the strike of the vein,—would not be in line with the vein to the east?

A. No. That is what I told you this morning, only from hearsay evidence, that those dislocations have been proven only thirty feet. That has been determined only since the transfer,—that is the existence of the fault and the amount [632] of dislocation, but the very important thing is that they started their work way at the east end, and prosecuted their work to the west, encountered the fault, found the dislocated portion on the west side of the fault, and they now connected up with these very veins that the property was sold on, in the Silver Bow, finding that it is the same vein. The property purchased covered Mineral Application 888 and the McQueen placer; that covered an area north and south of a mile and a quarter. They were pretty safe in their assumption that the vein would be found some place in their ground, but most of the operations have been carried on in 888, where the first assumption of the vein in the Silver Bow was made, that they would on the projection go into this piece of ground. There had been extensive developments on the Silver Bow at that time. I do not remember how deep the south vein or the Glengarry vein was exposed at that time. I think the Silver Bow was only a thousand—no, twelve hundred feet,—no, a thousand feet,—now it might be twelve hundred. I should say the vein had been developed along its strike about a thousand feet.

(Testimony of Samuel Barker, Jr.)

The size of the fissure and the extent of the mineralization were all taken into account in determining the probability of its continuing eastwardly in the Pitts-mont ground. That vein had a south dip and was from three to six feet in width, maybe a little larger in places and maybe a little smaller in places. I remember now that this south vein is not developed at the present time below the thousand-foot level of the Silver Bow. I think one reason why the veins in the vicinity of the ground in controversy have not been developed, is on account of the individual ownership, or on account of the fact that the property is owned by a great number of individuals instead of being owned by one company. I venture to say, if you should go out [633] to-day and try to get an option on any of the individual ownerships, that they would be very, very high, because the individual owner has a very high estimate of his small interest in the piece of mining ground, you will find. The Butte Hill was held in the same way at one time, but a very long time ago, before very much copper was extracted. As to that not preventing its development when people formed the belief that there was very rich and large deposits of copper there,—on the Butte Hill they did not have to have any belief at all. No matter where they went, they found copper, and those ownerships had not been individual for a great number of years. Defendants' Exhibit No. 2, in the case 9000 in the District Court of the Second Judicial District, of the State of Montana, was prepared in the office of Pennington and Barker, and was used in

(Testimony of Samuel Barker, Jr.)

that case. I know the case you refer to as 9000. I was a witness in that case regarding the showing in the Hornet cross-cut, but I did not have anything to do with the surveys at that time, or preparation of the map. This map was prepared from surveys. I consider them accurate. Mr. Pennington swore in this case, as to his surveys and that they were accurate. I cannot tell you whether this map is correct. I think in the main, it is correct. I think some of these locations, though, were put on, not from the actual corners that existed on the ground, I think Mr. Pennington testified to that fact. This survey of these objects, openings and so forth, is the survey that he testified about in that case, and I heard him testify in this case that some of the corners of the locations were not on the ground, but I do not remember how he did put that on that map. There is a representation on this map of certain mine workings here, and there is what appears to be a representation of the shaft that is marked Gulf Discovery, and of [634] another shaft marked Hornet Discovery. As to the cross-cut not being extended further in a southwesterly direction than the Gulf Discovery,—I do not remember if that represented the condition as it existed at the time. I went as far as to see the Hornet Discovery at that time. That would be about fifteen feet southwest of the Gulf Discovery. I think the Hornet Discovery at that time was as the condition is shown at the time this survey was made as represented on this map. Of course, in preparing the map which I swore to at this time, I did not know

(Testimony of Samuel Barker, Jr.)

where certain of the old claims were, that were sworn to at the original hearing, and as we had not seen the map introduced, and the Point Pleasant and the Pleasant View were placed on Defendants' Exhibit No. 1 from the original adverse plats of those claims, against the Butte and Boston Placer. Defendants' Exhibit No. 2 is the map and I recognize it as the map introduced in the case referred to. Of course, I had nothing to do with that map at all in my testimony. I was not in Butte, as I remember, when that survey and the map was prepared, and my testimony related entirely to what I found in the cross-cuts from the Mullins tunnel to the Hornet Discovery shaft.

Redirect Examination.

(By General NOLAN.)

The WITNESS.—Referring to the map to which my attention has been called, there is no connection shown between the Mullins tunnel and the Hornet Discovery. I stated the other day that I went through the cross-cut that was opened through to the Hornet Discovery, but not as it is to-day. The portion of the cross-cut next to the Hornet Discovery was not as large as it is to-day. That is what I mean. There was a very small opening between the cross-cut and the Hornet Discovery shaft, which [635] was not large enough to crawl through at that time, for a small distance; that is, a small distance next to the Hornet discovery. I do not remember how far it was, maybe a foot or two, only, and maybe, two or three feet.

(Testimony of Samuel Barker, Jr.)

I have stated that I did not know whether chrysocolla would be soluble in water or not. I have not tried any, or made any tests on the solubility or insolubility of the various copper minerals. I do not know whether or not water impregnated with alkali, and likewise being impregnated with carbonates, that spring into existence through the decomposition of granite, would operate as a solvent or not upon chrysocolla.

Where they are invisible, the faults may or may not exist. Considering the ground itself in question, I would not be surprised at finding them west of shaft No. 21, or not finding them.

Q. So that, really, as far as you are equipped now, and with the work done upon the ground, you are not able to say as to whether or not a single fault would be encountered by a lead in its westerly strike, extending westerly from shaft 21 until we get out of the ground in controversy?

A. I do not know anything about that, because there is no developments to prove what the conditions are there.

Q. And in the light of all the testimony that you have given us as to the existence or nonexistence of faults, and the reasons for saying that this northerly lead, as it is known to you there, is a portion of the same system,—what is your opinion now, in the light of all the testimony which you have given, as to whether or not this lead, as it is disclosed in the openings, is one and the same system of leads?

A. Yes, sir, from the examination I had made of

(Testimony of Samuel Barker, Jr.)

all of the openings made into the ground, along the north vein, I think that originally those dislocated portions found now, were all [636] of the same vein system.

There would be no more difficulty in locating a strip of ground twenty-five feet on each side of this lead than though there were three hundred feet on each side to locate,—the three hundred feet on each side of the center or three hundred feet from the center of the lead. Whether you make your measurement adopting as the initial point the side of the lead or the center of the lead, the difficulties are the same, because the walls of the vein would have to be found in either case. To determine whether or not there is another lead existing with a strike to the north, a cross-cutting of the entire area would have to be done, as covered by the Butte and Boston placer from north to south. A cross-cut would have to be run at sufficient depth beneath the solid rock, that no doubt could exist. Of course, we have such a thing in the Butte camp as veins with a blind apex,—that is, they are found a long distance beneath the surface of the ground. The leads in this camp do not invariably come to the surface of the bedrock. In a great number of the most productive veins in the copper district of Butte to-day there is no surface out-crop. That is equally true of the faults, you find them sometimes coming to the surface and sometimes deep seated, and not showing in the upper workings of a mine.

(Testimony of Samuel Barker, Jr.)

Recross-examination.

(By Mr. SHELTON.)

The WITNESS.—As I remember, when I examined the ground, the cross-cut had been extended from the Gulf toward the Hornet shaft, but not quite into it. I think the map which we have here, which does not show any such cross-cut, was correct at the time the survey was made. But certainly Mr. Mason, who was doing the work, would be a more competent witness than I am [637] as to that point, because he was there at the time Mr. Pennington made the survey, and from that time on during this proceeding in case No. 9000. I know that the survey had been made before I visited the ground. It might have been that after I visited the ground that the cross-cut may have been extended from the Gulf toward the Hornet shaft.

[**Testimony of Charles E. Kinman, for Defendants.**]

[638] CHARLES E. KINMAN, duly called and sworn as a witness on behalf of the defendants, testified as follows:

Direct Examination.

(By General NOLAN.)

The WITNESS.—My name is Charles E. Kinman; I live in Woodville; I have lived there about twenty-nine years and a half. My principal business has been prospecting and mining. I am postmaster up there now, and have held that position between sixteen and seventeen years. Woodville is not in Silver Bow county; it is on the line between the two

(Testimony of Charles E. Kinman.)

counties; my place is exactly on the continental divide, and in 1882 I lived here in Butte for about five or six months, before going to Woodville. When I came to Butte I came from Missouri. I went to Colorado in 1876 and was there and in South Dakota in '76 and '7. In those two places I did considerable prospecting, both gold and silver. I have also done placer mining. Up at Woodville I have been engaged in that business sixteen or seventeen years. My place is about two and a half miles from the ground in controversy here. I have prospected for copper mines. I located a claim in May, 1882, southeast of the ground in controversy, probably six hundred yards, the first stakes I put out in Montana. That was on a copper prospect. Since that time I have located other claims for copper, gold and silver. Everything up in my section is thought to be copper, gold and silver. Since I came to Montana I have not gone outside of the state.

It will be thirty years next May that I have known the ground in controversy here, known as the Butte and Boston placer. Since the time I have known it, the ground itself, and also the ground adjacent to it, I have not known of any placer mining work being done upon the ground. It has no showing there to indicate placer of any kind, because there had not been any [639] erosion. They simply drift there down the hill, lighting on a loose bedrock,—which has a pitch to the west of something like ten degrees, and gold deposited there, if it ever had been deposited there, would never have stopped going until it got

(Testimony of Charles E. Kinman.)

into the Silver Bow creek. There is no wash there, any streaks of black sand, nothing to indicate placer at all.

I have been upon the ground recently and have made an examination of the workings there for the purpose of determining whether any quartz leads exist on the ground or not. I made a location on territory adjacent to this ground in 1882. I also made a location covering a part of this ground in 1882 that I never completed. I simply posted a notice on the ground and put up the corners and I was not looking for copper. I was looking for silver and there was no silver values in the ledge that cropped out there, now,—it is not there now, however, to amount to anything. It has been filled up probably ten feet, and I found no great values in silver, and it was somewhat out of my way and I never made a record, I never perfected the location.

Assuming that on Defendants' Exhibit No. 1 the red line represents the placer ground, the claim that I attempted to locate in 1882 would lay with its center near the Hornet tunnel, probably fifty feet to the southwest from the Hornet tunnel is where I estimate that my location now was made. The discovery was in a little gulch that lays right to the southwest of the Hornet tunnel, about fifty feet,—something like that. The gulch runs from the southwest to the northeast. As to my discovery,—the water had cut down by the side of the ledge of red looking quartz,—cropped up about two feet on the side of the bank. It had some copper stains, and there were some small portions of

(Testimony of Charles E. Kinman.)

cuprite of copper and green copper stains in the rock that was cropping. It was an east and west vein, with a trend to the northwest. Fifteen feet in length and about two [640] feet in depth of the lead was disclosed by the break caused by the gulch. That exposure is not visible there to-day. The country at that time was covered with grass and above timbered, and the hills were timbered, and that timber has been cut away, and the grass has been killed off and the debris from the hill has filled all that up, so it does not look hardly like the same place. On the ground in controversy there was lots of float, showing copper stains, and just at the edge of it, on the west side, there was a cut owned by some big fellow, a Frenchman, I believe, as I remember, a cut about thirty feet long, and in that there was disclosed a wall of quartz vein—quartz, as I remember, about ten feet in width. The course of the vein disclosed in that cut seemed to be east and west. That was about east of the Hornet discovery shaft, maybe a hundred and fifty or two hundred feet. That cut was filled up with this drift. You can see some trace of it there yet. You can see where it has been, but it has filled now with debris coming down the hill,—drift. There was a good deal of float scattered down the side of the hill there,—everywhere. It was not rounding. It was broken, with a sharp cleavage, and jagged points,—rough. There is no erosion on that hill. Where erosion takes place in waters, either in the bed of a running stream or in a lake, and all this drift coming down that hill is in that form. It is sharp,

(Testimony of Charles E. Kinman.)

jagged, rough cleavage. The *existed* of that float in the form in which it was suggested to me that there was mineral veins there. As to why I say that the formation is such there as to suggest that there is no placer there,—the fact that there is no erosion,—the fact that there is no sediment of the drift that has come down the hill in the stratas that you first find in a placer mine,—lodged boulders, if there are such, within the next strata, will be fine boulders, [641] and the next will be black sand and fine gravel, and that lays on the bedrock mixed with any kind of precious stones or what the placer miner often calls black rubies and red rubies, and if sapphires abound in that country, it will be in that country, it will be in that strata and all kinds of heavy material; and if the distance to bedrock is thirty feet, at I have it up there, in one place the material will all be of immense weight, near to the specific gravity of gold. As you approach the bedrock, there is nothing of that kind here. The loose dirt, mixed with vegetation,—vegetable matter,—and loose earth and rocks, without having been eroded,—jagged points, sharp, in all kinds of forms, manners, without any stratification whatever,—just as drift would come down the hillside. The continental divide would be the summit of the Rocky Mountains. If there is a continental fault up there it occurred before my time.

I made an examination of the ground within the last few days. I have been there three times for the purpose of making the examination. There are two quartz leads traversing that ground. I knew them as

(Testimony of Charles E. Kinman.)

the Hornet and Rabbit. One is on the north side and the other is on the south side. I have in mind the shaft you refer to as Shaft No. 21 on the Rabbit lead. I went to the bottom of that shaft. It was all vein,—everything in the shaft was vein material, in my opinion, in the bottom, I mean. I classify it as vein matter,—it consisted of quartz, some talc and oxidized matter, all bearing silicon. I have no hesitancy or doubt as to that being vein matter. There were no walls to that vein. I say that because the granite nowhere came in sight in the shaft, and no evidence of walls. By the term wall in connection with a vein, most anything may constitute a wall. Ordinarily in a granite formation, we [642] count the country rock,—granite, the walls. You can tell the wall from the vein because it is a different material. The vein is softer and more crystallized, and contains more mineral. It is a different thing altogether from the walls. The wall is simply,—in this case it is simply Silver Bow county and the other is the vein. There was difficulty in telling at all times just where the vein ends and where the wall begins. Sometimes we encountered gangue rock and stratas, especially on the soft walls side, like the footwall,—there is frequently, it is pretty hard to determine the exact location of the walls near the surface. It will be mineralized sometimes to a small extent, and there will be stains,—mineral stains in it,—and it will be of a soft nature,—the footwalls will frequently be, near the surface. In this vein that I encountered in this 110 shaft I did not see any walls at all. It is all vein

(Testimony of Charles E. Kinman.)

matter. The direction of the strata in the shaft would indicate the direction of the vein, and consequently the direction of the walls,—that is they would be at right angles to the course of the vein, naturally, and the direction of the strata in the shaft would determine the course of the vein and the direction from the shaft to the walls. The stratification indicated the vein running easterly and westerly, with a trend to the southeast.

I went into this tunnel that is immediately east of the shaft No. 21. That is tunnel No. 30, and I found in that tunnel a cross-cut to the south, with a vein showing about fifteen feet wide, with more yet to come, if the cross-cut had been pursued farther. In that cross-cut I believe I found the wall to the lead that was disclosed there. I made some memorandum at the time. There was a wall on the north side, I believe, of that tunnel. Here it is, (indicating on map). [643] It seemed to be the same strike, the lead disclosed in that cross-cut, as the lead as disclosed in the discovery shaft of the Rabbit, and also in the hundred and ten foot shaft, and the stratas in that shaft seem to be running in that direction. I saw no lead except in the cross-cut,—the tunnel itself was in granite. I do not remember any discoloration in the granite; except a brown stain, saw no discoloration of the granite in that tunnel.

As to the term *chrysocolla*, I think is a term that geologists use to raise a fog. As to Defendants' Exhibit No. 94,—I saw in that cut some rock like that, all around there,—lots of it, around on both these

(Testimony of Charles E. Kinman.)

leads, on the course of both of them, around on the Bullwhacker. There was rock of that character in the leads, but mostly quartz.

I was also in the shaft you refer to as Shaft No. 1, a shaft further east, and about twelve or fourteen feet deep. I found two small streaks of quartz there, one on each side of the shaft, and the vein matter,—all vein matter in that shaft,—oxidized. I think those streaks of quartz cropped to bedrock and extended down six or seven feet, anyway. I did not see any wall there.

Q. Now, what do *you* as, Mr. Kinman, as to whether or not those streaks there, with that vein matter, were of such a character as to indicate the existence of a vein, which you, as a mining man, would be justified in locating the ground as a mining claim, and prosecuting work on it.

By Judge BOURQUIN.—Objected to as immaterial.

A. I should not hesitate to make a location on a showing of that kind, if the country I was prospecting would justify location of any kind.

The WITNESS.—It seemed that the streaks there had the same course as the other places that I examined along that line, northeast and southwest,—or northwest and southeast. The dip of the lead was to the north.

I also went into shaft No. 2. I found more of this brown quartz there,—I found it extending clear across the shaft in a solid body, at the east end, and the lagging was in the west end. There was a little

(Testimony of Charles E. Kinman.)

cut there, I think, no, there was no cut, but there was on the side,—there was some of this brown rock [644] encountered, and I found some streaks of magnetic iron there, on the north side of the shaft. I would call the deposit there quartz and vein matter.

Q. And I will ask you the same question in reference to that,—would you, as a mining man, having in mind the conditions there, locate that ground as a quartz claim, and be willing to spend your money in its development?

By Judge BOURQUIN.—Objected to as immaterial.

A. Yes, sir.

The WITNESS.—I went from there into the tunnel. Up there we got streaks of copper,—green copper, and some cuprite of copper, black oxides, in small quantities, very small. I found the best showing in the north cross-cut in that tunnel, two streaks of copper, one about a foot wide, and the other about two and a half wide, on one side, and three and a half on the other side of the cross-cut. I saw a vein there, measured the width of it. I measured it on the north cross-cut, where the wall is encountered to the north back to the tunnel, where it is then encountered to the south,—and thirty-seven feet. There is a vein there, thirty-seven feet in width. That is in the north cross-cut from 31. I was able to find the foot-wall and hanging-wall of that lead there. I found the footwall in the tunnel, running along the course of the vein, or somewhere near it. The hanging-wall was in the breast of the north cross-cut, the first of

(Testimony of Charles E. Kinman.)

the north cross-cut in that tunnel. There is another one further along. I also found the lead farther along in this tunnel, in the main tunnel, and it extended all along, and after we left the north cross-cut, a short distance, we encountered the vein and it extended almost to the east end of that tunnel. I saw a fault in that tunnel. It did not seem to have any effect upon the lead as it existed there. Of course, it displaced it slightly, but nothing to change its general course. I could not say what distance you would see the lead along the tunnel. I did not measure the length of the [645] tunnel, and to remember just how long that was,—I do not remember but it seems to me about forty feet. I found the face of the tunnel,—there was a streak of tale on the hanging-wall, and that cut into the face of the tunnel some distance, pretty near half of it, and the rest was in copper ore.

I also went into the first cross-cut running to the southeast. That is all granite, all country rock, pure, gray granite.

I went into the Rabbit Discovery. I found a lead in there. I examined particularly the west end of that shaft, and I found a streak of green copper in there about six inches wide, and that shaft also discloses the hanging-wall, well defined. The lead would be a little to the south. Including the Rabbit Discovery shaft, it would lay to the south. I was able to tell from the location of the lead disclosed in the Rabbit Discovery, what the strike of the lead was. Its strike was the same as these others. Its dip was apparently the same as the others.

(Testimony of Charles E. Kinman.)

I also examined shaft No. 9, south of the Rabbit. The upper cross-cut was in green copper. The east end of that shaft, where the lagging was removed, was all ledge matter, mixed with a little green copper.

Q. And what would you say as to whether or not the mineralization was such in the No. 9 shaft, not referring to the cross-cut at all, but to the shaft itself, so that you would locate it as a mining claim?

By Judge BOURQUIN.—Objected to as immaterial.

A. Yes; the mineralization was good, strong.

The WITNESS.—In my judgment, having in mind the disclosures made in those different openings, and the vein existing in those openings, it is one and the same vein.

As to shaft No. 19, I find down at the bottom of that shaft vein matter and a wall to the south, and the rest of the shaft is all in lead matter. Some of it is oxidized, some is quartz, soft—it is only sunk a few feet below the bedrock. I find talc there. The existence of talc in the situation in [646] which it was there, suggests vein matter and vein action. I could not tell from the shaft as to which one of the walls it is that is disclosed in that shaft, as only the top of the wall is exposed. I would not know except by its position and its connection with the other workings along that vein, which wall that was. From the streaks in the lead—the stratas—I would conclude that that was the hanging-wall of the south dipping vein, slightly dipping to the south, not a strong dipper.

(Testimony of Charles E. Kinman.)

I went to tunnel No. 35. As to any evidence of a vein that I found in there, I found this sugar loaf quartz that some of them have been calling aplite. It was bedrock—solid. I found evidence of a vein in there,—that I would call a vein. I found it in the cross-cut to the north, near the breast of the tunnel, and some short distance back and extending to the breast of the tunnel. It was vein material that I found there. It extended the full length of that cross-cut, the width of that tunnel, and I do not remember just the length of that cross-cut, but it seems to me ten or twelve feet, as I remember it—about sixteen feet of vein matter, probably, there. That is in tunnel 35. It seems to be an east and west vein, judging by the stratas there. Its dip was to the south, judging by the stratas, slightly.

The next tunnel that I went into was tunnel No. 36. I found lots of vein material in the tunnel and in the two cross-cuts running north, granite in the one extending south. I do not remember any difference in the material that I saw in the tunnels to the north and the tunnel to the south. I do not recall any to mind now. The ore extended along the east,—I would call it commercial ore, in streaks, all through.

The next tunnel that I visited was tunnel No. 37, on the [647] easterly course. Tunnel No. 37 was a big affair, and it includes the Mullins tunnel, and there is parts of this tunnel filled up and the south tunnel there, which is south of the vein, and then going in, I should judge about seventy-five or a hundred feet, there is a tunnel extending north, a cross-

(Testimony of Charles E. Kinman.)

cut extending north, which shows the vein. The workings there are quite extensive, very labyrinthian.

I remember being down in the Hornet Discovery shaft. There was a vein with some copper stains extending across the shaft to the wall, which dipped to the south, and under that was a streak of oxidized quartz, adhering to the wall, or joining the wall, and had the same dip as the granite wall. It is all lead matter in the upper cross-cut running from the tunnel to the Hornet Discovery shaft. I say that because I found lots of copper ore there, and copper stains extending the entire width, closely inspected. In places there is parts of it would be shipping ore—would be commercial ore, and part of it would not. I noticed the inclined shaft there, the Mullins shaft there, so-called, going down into the ground. I made no examination of it, however, from the fact, as I understand, there is water in it. I did not go down in it. I think possibly the north side of that tunnel is the footwall of the Hornet lead, but the south side is solid ore, commercial ore, extending the full length of it, and from the cross-cut leading to the Mullins, or to the Hornet shaft. I think that the lead that I say exists there, extends from the north wall of the Mullins shaft to the Hornet Discovery shaft on the south. The hanging-wall is in the Hornet Discovery shaft, and the footwall is the north side of the Mullins tunnel. The course of the lead is easterly and westerly, maybe varying a few points. The dip of it was to the south. Having in mind the strike and conditions [648] existing there, in my judgment

(Testimony of Charles E. Kinman.)

this lead that I speak of in the Mullins tunnel and extending south from the Mullins tunnel, is the same lead from the one, or ones, which are exposed to the tunnels to the west, and the shaft to the west. The lead measures, from the south side of the Hornet shaft to the footwall on the Mullins tunnel, thirty-two feet. I gave the width of the lead that exists in the northerly portion of this ground, known as the Rabbit lead, as thirty-seven feet.

Q. And what do you say as to whether or not the evidence of a lead in the Hornet Discovery shaft is such that you, as a mining man, would be justified in locating the ground and prosecuting work upon it?

By Judge BOURKUIN.—Objected to as immaterial.

A. I should certainly like to have that opportunity.

The WITNESS.—I knew this ground in 1891; I knew it all the time from 1882. I could not say as to what openings there were there in 1891; I believe there were, in fact, I know there were some openings on that ground at that time, but it has been so long ago, to give the definite location. Not having any interest at that time, I would not be able to give any definite locations. There was ore on the dumps in the gulch down on the Bullwhacker claim. It was there in 1882, and I believe it remains there to-day. I could not say positively as to the Butte and Boston placer ground. I do not remember.

Cross-examination.

(By Judge BOURQUIN.)

The WITNESS.—I have lived in Woodville about

(Testimony of Charles E. Kinman.)

twenty-nine years and a half, prospecting and mining most of the time. I have been mining generally for myself, sometimes in the employ of others, but generally on a contract for others, when so employed. I seldom worked for others,. I have located claims up at Woodville that are still working. They are not producing [649] except the gold properties. The placer claims lay to the east of Woodville, just a mile, and extend further on, of course, in Sherman gulch; to the right as you follow the railroad. I have placer mined there sixteen or seventeen years, and still working every season some. Woodville is about two and a half miles from the ground in controversy. The placer claims are just a mile beyond Woodville, where they begin. To get to Woodville you rise a good deal higher than the Butte and Boston placer—a thousand feet, from Silver Bow creek, according to the geological survey and the railroad survey.

By drift I mean all the substance above the bedrock that has come down by drift. Wash is, or erosion is—takes place in a running stream or lays in the bed of a lake, where it is eroded by the waves. Placer is produced by erosion, the grinding up of the gravel in the placer streams, is the source of its gold. I mean to say that this erosion process cannot occur anywhere except in the bed of a stream or lake. There is no evidence of eroded material on the ground in controversy. There is no rounded pebbles. This is simply mixed with vegetable matter, sticks and stones and loose earth, and sand—all granite sand—came down in cloudbursts and things of that sort

(Testimony of Charles E. Kinman.)

from the hills above. The sources of the placer deposit, is the gold deposited in the lead, and sometimes in formations there is extensive formations that carry gold to a small extent, and that washing down or coming down in the form of drift into the stream, it is then acted on by the running water and eroded, and every streak in a gold producing section is an arrastre grinding this substance up and the gold being the heaviest material, deposits on the bed of the stream, or on the side, if it is rapid.

Q. Well, do you know on the ground in controversy, in ancient times, where this creation of placer took place, there was known [650] any stream there or channel?

A. There is no indication of anything of that kind. It would be at bedrock. At bedrock there is no indication of that kind, so far as I have been able to find, and if there was such a thing at bedrock, it would be shown on the surface. As to this drift coming down from the hill covering it over, it covers it over to some extent, and yet some of it works to the top, and that fine material settles under it.

Q. You think, if there was gold in the veins and in the formation on that side of the creek, that this drift could not have created from it any placer deposit?

A. It would have created it within the creek, but not upon a flat side of that kind, where the bedrock is soft and pitches to the west. That gold would never stop. It would gravitate into that creek. It would, regardless of whether the enclosing material

(Testimony of Charles E. Kinman.)

did or not; if that material was rotten, it could not hold it. If there was rough bedrock there, or what we call shallow bedrock, then you could find plenty of that on that sidehill, providing any had ever come from that section. As to how gold travels in the rotten bedrock, it moves on it, along with its gravity, its weight, and the movement of water that comes down there in the spring, the gold is always moving in the ground, and extending for miles where you—if there is slope enough to run the water; it would not run without the slope. I did not make any tests for the gold by panning. There was nothing to pan for, no appearance of anything.

I spoke of finding a vein or wall of quartz on the ground in controversy in 1882. I should judge it was fifty or sixty feet to the southwest, in a little gulch that is there. I did not estimate the distance on the ground, however. The Hornet Discovery was not there at that time. The gulch is [651] still there in parts. It extends down on to the flat. As to how I can determine at what point in this gulch I saw this wall of quartz—it is just a matter of memory and the fact that I was passing frequently to a location that I had belonging with some other parties, to the southeast. My course laid over that place in coming down from Woodville, and down Park Canyon, around over the hills there, that was my natural route, up to this shaft that I was working on the hill there, up six hundred yards to the northeast, or southeast. It was near the head, I remember, of the gulch, and on the south side. The gulch ran southwest from

(Testimony of Charles E. Kinman.)

the Hornet shaft, in that direction. The wall of quartz was exposed near the head of the gulch and on the south side of the gulch. The water had run against it, you know, and took its course with the vein for a little ways and exposed it. The vein evidently dipped under it. I never saw the vein again. I made the location and practically did nothing more with it, except to have an assay made and stake it out. The course of the vein seemed to be east and west, or easterly and westerly. It had a width of two or three feet that I could distinguish. It is probably covered up to-day. I do not know how deep, but probably ten feet. It would be somewhere in the south of tunnel 37, a short distance. That would be fifty or sixty feet of the Hornet shaft, somewhere there. I do not give no distances positively on that, as it is not in—not entirely in sight, and a matter of memory. It would lay on my map right where I indicate, probably I would have it southwest of the southern branch of tunnel 37.

Q. Did you know that southern branch of tunnel 37, or cross-cut?

A. I think the thing was filled up in places, anyways. I was in it. I did not see any evidences of the vein that I saw in 1882. That branch of tunnel 37 was in granite,—that is [652] my recollection. I did not make much of an examination of that portion down there. In places it was caved in. In 1882 I was working occasionally on the prospect which Mr. Brundy now has, and it lays to the southeast of the Hornet, about four to six hundred yards. I make

(Testimony of Charles E. Kinman.)

a location on it. There were other parties in with me, and in '83 I did my assessment work but they failed to do theirs, and I let it go.

I was down in shaft 21, I think it was last week, probably Tuesday. The material there is vein matter. I mean by vein matter what we ordinarily find in leads in this vicinity. In this instance there was some quartz, scattered through it, some talc and oxidized material, showing vein action. I mean by vein action, as the water forces through the veins, probably, or other causes, there is a motion there that creates, grinds up, the material. I saw some of that there. There was slips and stratas and the color of the matter all indicated vein matter. These slips and stratas and talc material I saw there all seem to run in one direction. I did not observe any cross stratas or slips at all. I think I could determine whether that was a fault or a vein there. As they distinguish them ordinarily, a fault is a kind of a cross-strata that has been filled up with water action, probably. I do not attach much importance to them, however, and it crosses a vein sometimes at right angles, or nearly so, and usually forms a kind of a wall out of vein matter or a vein. In where it don't cross the vein it would still be a partial fault. I would not attach no consequence to it, if it did not extend across the vein. I would not be able to distinguish vein material, then. I had a pocket compass with me. I laid it by these slips and strata I saw in 21. I did not use it to make any survey—it was just as a guide as to directions, and approxi-

(Testimony of Charles E. Kinman.)

mately. You can't survey [653] with a pocket compass, but the indication there was the same as I found all along the direction. The course was a little southeast and northwest. I should say the departure from north was probably six or eight degrees. It was only a guide, a mere guess, you know, with a pocket compass, but it is an approximation. As in the others, I could not see very well in the bottom of the shaft,—I could not see the figures on my compass, except the large ones, north and south, and the candle was not burning strong enough. I saw lots of oxidized, iron stained material in shaft 21. I saw no copper, and there was some of that red material might have been saturated with copper, but not with the kind of copper that exists above there. There is no walls exposed there—the guide is only by the stratas, to tell the direction.

I went next to tunnel 30. There is a hole that I went down into the tunnel,—went down into a hole and there was a cross-cut to the south, after I got into tunnel. The tunnel extended on a little farther—I do not remember—I believe it was fifteen or twenty feet. In the south cross-cut I found a vein of quartz, fifteen feet wide, with the full width now shown. The hanging-wall appeared to be near the mouth of that cross-cut. The footwall was out of sight. I know what is termed aplite. I did not find any aplite on this ground.

I saw material in that cross-cut and tunnel resembling Defendants' Exhibit 80. That appears to be a very good piece of quartz. That looks like the

(Testimony of Charles E. Kinman.)

material I saw in the south cross-cut in tunnel 30 *and in tunnel 30*. I took the course of the material in the south cross-cut in tunnel 30 as best I could. It was too near the surface to get a very definite idea. It seemed to be easterly and westerly, though. I would not say how far it departed from east or west because I am not a surveyor. [654] It was not halfway between the cardinal points of the compass, probably quarter ways. It would be a quarter of the way between west and north. You could not very well determine at this point; that is very shallow there, right near the surface. There is too much surface rock in there and debris. I did not observe any evidence of faulting in that tunnel. As I remember it the rest of the tunnel was in granite. There is so many excavations over there that a person cannot remember every spot, or at least I cannot.

As to the mineralization in tunnel 30 and its cross-cut, I saw that oxidized material mixed through the quartz. I did not see any copper there at all, not a particle as far as I could see. I went down shaft 1. I found two small streaks of quartz, and the whole thing seemed to be vein matter. One of the streaks of quartz was about two or three inches; and the other was about four inches. They were not so hard as Defendants' Exhibit 80. They were more honey-combed, more sugary. I would not say they were the same as the material shown in Defendants' Exhibit 80. They were somewhat similar, they are softer. I do not think that is the only difference in appearance. I was not reminded very strongly of this rock

(Testimony of Charles E. Kinman.)

when I was looking at it,—observing it. The mineralization in those streaks of quartz in shaft 1 was iron stain. I saw no evidence of copper. I believe the larger streak was on the south side. It showed in the west wall near the corner; on the west wall of the shaft, not of the vein, but of the west wall of the shaft, near the corner, extending westward. It showed on the east wall of the shaft. The shaft showed it on both sides. The southern wall of the shaft was vein matter; streaks were near the walls, but I would not be certain, but I believe they went [655] down on the walls of the shaft. They did on the north side, anyway. I had the same characterization of that as vein matter. It was composed of quartz, iron stains, oxide of iron, and whether there was any silver or gold in it, I do not know of any. I laid my compass by the side of those streaks in shaft 1. As near as I could approximate the course was the same as they were in the other workings along this—along the course of this vein—a few points to the northeast, if you were going in that direction; maybe a quarter between the cardinal points. The streaks ran southeast and northwest, to the best I could determine. I laid my compass in my hand in all cases.

I was in shaft 2. I found plenty of brown, iron stained quartz, more abundant than in shaft 1. The quartz I saw in that shaft was not so hard as Defendants' Exhibit 80. It looked similar,—it was a brown quartz and stained with iron. I have characterized Defendants' Exhibit 80 as brown quartz. In shaft

(Testimony of Charles E. Kinman.)

2 it was browner, more solid with its brown, and not so hard. It contained more iron and was not so hard, and it was about the same character of quartz that I found in shaft 1. As to the course of that streak,—if you were going in a southeasterly direction,—if you were going east, it would have a few points to the south. It was clear across the shaft at the east end. The quartz body extended clear across the east end of the shaft. It was as wide, if not wider than the shaft, apparently. My particular examination was on the east end of the shaft, and I do not remember as to the west end of the shaft. It must have been about the same, or I would have noticed the difference. I am sure that the west end of the shaft was not granite. As to how much of the west end of the shaft this brown quartz filled—[656] I do not remember particularly as to the west end, but I presume it was the same as the east end, or I would have noticed it. I do not remember to have seen any stratas of any kind in shaft No. 2 running northerly and southerly through the shaft. As to having seen the streak of aplite that Mr. Barker has spoken of, running north and south in shaft No. 2—I do not remember to have seen a streak of any kind crossing that shaft. The material in shaft No. 2 I call that vein matter. I should locate it, if I thought well of the ground generally down there. I have not any doubt but what it is a vein; a vein of quartz in place.

I found the vein in the north cross-cut in tunnel 31. The footwall was in the tunnel. The tunnel

(Testimony of Charles E. Kinman.)

had cut the footwall out. We had to make some examinations there on both sides of the tunnel in order to find the course of the wall, and as near as I could determine it was right about a foot from the mouth of this cross-cut in the tunnel. I could not see it in the back; opposite the north cross-cut, nor in the roof exactly, either. I think that was yet bedrock, but we could see it on both sides of the tunnel as it passed along the tunnel—cross-cut in like, you know, the main tunnel—and as near as I could come, it had vein matter on the sides of the tunnel. Its thickness—oh, it joined the granite in front—it was the footwall—was in the tunnel at that point. It is on the north side of the tunnel, within a foot of the cross-cut. As to the material in the cross-cut, right commencing at the tunnel, going north—in my judgment it was all vein matter, to the breast. The roof of that cross-cut may not be within the bedrock. I am not positive. I do not believe it is. I do not believe the roof is, or the back. The vein matter in that north cross-cut next to the tunnel, and until you come to the next streak [657] of ore, is nothing like Defendants' Exhibit 94 shown me. It was with green streaks through it—quartz. The first streak was in ten or twelve feet, may be fifteen, from the mouth of the cross-cut. It was about a foot wide. The material beyond that was all vein matter to the next streak—quartz. It was not quartz resembling Defendants' Exhibit 80. Its color was lighter, and its texture was also different, somewhat different. This is very much harder than that quartz. The other streak, on

(Testimony of Charles E. Kinman.)

one side it was about two feet and a half wide, on the other about three and a half, across the tunnel, the way it spread there. Beyond it, in the face of the cross-cut, was solid granite—rock. It was the wall. That would be the hanging-wall of a north dipping vein. They either had struck the hanging-wall, or else a horse, and it was not deep enough for horses. You do not find a horse in a vein at such a shallow depth. In my judgment that is the hanging-wall. Coming out of that cross-cut and going toward the face of the tunnel, you next encounter the vein about fifteen feet from the cross-cut—ten or fifteen—somewhere there—didn't measure it—we encountered green stains on the left and north side, and these, apparently—these streaks that we saw in the cross-cut—were passing through it. At that point one of them was quite large. I could not give you a bearing on that on account of the course of the tunnel, and course of the streak on its width—I had no right angles to measure it, but it seemed to be fully as wide—wider than it was in the cross-cut. That was the streak nearest the outside; that would not be the southernmost streak. I think the northern one come in where there is a small cross-cut leading to the north and south. As I was going toward the face there was a slight fault in there; a fault that cuts the tunnel at right angles—something like that. I saw the vein on the tunnel's face since of that fault—all along there. In [658] my opinion the tunnel is entirely within the vein, to near the end of it—to near the face there; the wall seems to crowd in.

(Testimony of Charles E. Kinman.)

That is the wall of the vein, in my opinion. It is granite. If it was the wall of the fault the supposition is that it would not be granite. A fault might occur in the granite the same as it may in the lead, but a granite fault would not be injected into a quartz vein. I assume I have the vein there. I do not know whether the fault farther back in the tunnel might have thrown the vein either north or south. Out in that eastern country, there is a great many faults in all the veins. We never attach any importance to them. We do not pay any attention to them in mining.

In this southern cross-cut from the face of tunnel 31 it is all lead matter. You do not see either of the two large streaks that we had in the north cross-cut in that southern cross-cut. I think there is no extensive mineralization at that point—no commercial ore. The material there does not resemble Exhibit 94 brought in by Mr. Barker. I would say it was quartz, in that south cross-cut near the face of tunnel 31.

Q. What becomes of those two large streaks you say you saw in the north cross-cut, if that is the vein in the face of the tunnel, and in that southern cross-cut?

A. Well, they are going on to the north of that point. They cross the tunnel and bear to the south. They cross the tunnel near the face. You see them all along from—well, some little distance before you reach the south cross-cut—that is, near the face. Those two streaks do not appear in the south side of

(Testimony of Charles E. Kinman.)

the tunnel, but the ore appears, and as I said before, the direction of the streaks and the direction of the tunnel being different, it is pretty hard to get a right angles measurement, or a judgment on those streaks as to just what course, [659] or just where they are at, and what their width would be. The streaks as I have mapped out here, they cross the tunnel between the south end of the cross-cut, near the face of the tunnel and the north end of the cross-cut extending north, right opposite. You cannot see them appearing on the south side in such abundance as they appear down in the cross-cut north of the mouth of the tunnel, but they are still there somewhat—vary somewhat, as they go up the hill. Their course would not be considerably different from what it is in the north cross-cut. I think this wall that I saw in the face of the tunnel has the same course as the vein in the north cross-cut. The footwall runs along in front of the first cross-cut north of the cross-cut, and then bears off to the south. All of the south cross-cut, near the mouth of the tunnel is in granite. Near the mouth of that cross-cut, of the tunnel to the north, a line drawn along there shows where that crosses. It crosses at very much of a slant. It appears at a point ahead of the north cross-cut about fifteen feet, in the south wall of the tunnel, may be twenty, I didn't measure.

I went in the Rabbit Discovery. As to how big a vein I found in that discovery shaft—I found a streak of green copper in the west end, in a little drift there at the bottom; it was maybe six inches

(Testimony of Charles E. Kinman.)

wide. The hanging-wall is exposed there on the north of that streak, in a little drift. The country north of that hanging-wall apparently would be granite. I had no doubt of its being the hanging-wall. As to about at what portion of this little drift it disappeared with reference to the dimensions of the shaft—the green streak was something like the middle of the shaft, and the hanging-wall was a little farther to the north. The streak came up close to the wall; the wall was exposed very nicely there—the streak was exposed [660] very nicely. This whole matter lay on the south of that. I did not see any wall there. The vein matter was quartz, stained with copper. The streak that I speak of is a copper-stained streak about six inches in width; it is quartz. There was no especial difference between it and the quartz lying on the south side of it. It is simply that matter in which the element silicon enters, and can be mineralized at any time when the earth seems to want it. This streak showed the presence of silicon. On the south the vein matter there was silicon. There was a difference in the mineralization of the two, but as far as the material was concerned, there was no special difference in the material that laid on the south. There was some little tale in it, but that tale, you know, is quartz grown up. The streak was more heavily mineralized on the south; it was green streak and the other was not. The other was iron rusted, and lightest streaks running through it, some of it brown. I did not see any green copper stains in the streak, not to the south of the strike, this is just

(Testimony of Charles E. Kinman.)

where—just below the wash or drift on the hill, at no great depth down. The only place I saw this streak in the Rabbit is in the little drift at the bottom. That is the only place I looked for it. I did not look for it in the shaft; it was getting late and it was getting dark, and I rushed the examination through to get out of there.

I went in the No. 9 shaft. At 25 feet down there was a cross-cut running to the north. I found green copper-stained quartz in that. All of that shaft is in mineral, but the cross-cut is green copper. It was all vein matter in that cross-cut. I think the entire cross-cut and the shaft are all in vein matter and one vein. This north cross-cut was near the flow, near the top of the bedrock—the drift matter down the hill—glacial [661] drift—and there was green copper stains all through there indicating it was the same kind of green-stained copper, of the same nature of rock or quartz, indicating the same thing, as the drift in the tunnel. I did not see any definite vein in the north cross-cut—a definite streak—the whole thing is vein. The whole thing was the same as in the shaft itself, only there was green streaks out in the cross-cut. I did not see any walls at all in that shaft or cross-cut. The matter that was colored green in that shaft and cross-cut was all quartz. Most all of that stuff is quartz—turns to quartz if you pursue it a little ways. It had got the same component elements as quartz, a little different in form, on account of the oxidation and the action of the elements, running water and things of that kind. In

(Testimony of Charles E. Kinman.)

that lead matter, as we call it, there is a little difference, but the whole thing is saturated with silicon. As to finding any rock out in that country that has not silicon in it—I guess what they call aplite has no silica in it. Granite is composed of quartz feldspar and mica. Quartz is silicon. There is no silicon in the aplite proper. By aplite proper I mean real aplite. The rock they ordinarily call aplite in that section of the country, in my judgment is not anything but quartz. You see some real aplite farther up the hill. Near the ground in controversy, farther up, there is some specimens there of float that I would call aplite. They probably do not contain any silicon. I do not know for sure, but I would not call them that.

The material in No. 9 shaft is not commercial ore; some of it may be, but most of it is not. As to observing the country rock in that neighborhood stained green with copper—they are green stains on some rotten granite. To the south of that, there is quite an extensive field of that along the big fault. It is over on Brundy's ground, across Horse Canyon. [662] You can see it on the Bullwhacker to a little extent. I do not know whether this green stain in the country rock manifests itself on the Pacific. I have not observed any green stain at the surface on the ground in controversy. On the Brundy ground, across the canyon, years ago I picked up some cannon balls there that were green-stained. It would probably be three hundred feet square, where I observed. Along there I have seen granite-stained at different

(Testimony of Charles E. Kinman.)

places—I don't know how many—that were stained with copper. They were more green than Defendants' Exhibit 94, and showing more copper. That is only in places where that occurs, very near the surface and where the granite is very soft, subject to displacement. Where I saw it it was apparently in the country granite. Now, it has displaced portions of the rock and it cannot positively be determined that is granite rock. It has some resemblance to granite, and always a rotten granite, but whether it is granite or not, I do not know. As to its being granite which had undergone some change by reason of the copper solutions coming over and through it—only from the fact of its position; that is, close to a vein or against a vein, and the vein shows that that is a wall rock there, then I would estimate that that was granite, but to look at the rock and determine from that fact that it is granite, I am not able to do that. Whether that is granite or belongs in connection with some vein, with a character of rock that has been saturated, in which this copper is found to exist, is a theory with me. I know that copper is carried in solution and precipitates on iron, but there is no iron in the granite ordinarily, that would be enough to stain it green. I have seen the country granite that looked to be stained green, but whether it was for pure granite, I would not be able to determine. I do not know of any precipitant where precipitation occurs, there must be a precipitant. The precipitant [663] is always iron, and the absence of iron from these veins in controversy, does not indicate to me that the

(Testimony of Charles E. Kinman.)

copper found there has been precipitated. In the north vein, down below there, where there was no copper, there was iron, and I found magnetic iron in one place. I do not know for sure that copper solutions will penetrate the granite and replace the granite to some extent, and color the granite green from the copper. I have seen things that looked like it—whether that was granite rock, I don't know—from the fact that portions of it had been replaced. My theory is that bodies of copper are just where they were to begin with. I don't see any very good reason for saying that these solutions containing copper come from great depth or great height, or great distance or any other place, and come down to this certain place or that certain place and deposited there—they could just as well come right up and deposit there. In the creation of the earth, we don't know where this copper come from, or how it comes to be in the earth at all. It could just as well be there as any place else.

Q. What is your reason for believing that all the openings you visited on the north vein are on one and the same vein? Do you find the material equally in all of the openings?

A. No, sir, there is a difference up in the ore chutes, from what there is down where the vein is not mineralized by copper, different in appearance and different in the constitution, to some extent. Down there in that portion, they are below the ore chutes, the size of the vein is not defined. As to there being a difference in size in those various openings—

(Testimony of Charles E. Kinman.)

width—there was only one point to measure—no possibility of measuring it at any other point—in each one of those veins. The strike was the same, as near as I could determine, in all the openings. As to the dip being about the same number of degrees—I think the dip on the Rabbit vein, down at the west end, is [664] flat. If faults were in the ground they would have no particular importance with reference to the vein, at the surface of the vein. The faults in that country*, as I understand it, or look at it, are seismic origin, and they would probably increase with depth, as a pendulum swings. I mean by seismic origin, earthquakes; that is thought to be electrical. Some geologists, Sir Charles Lyle, has that view.

Q. You consider because those openings on the north vein are more or less in the general direction of the vein as you saw it exposed, although they are in instances separated by as much as a hundred feet, that it is one and the same vein?

A. One and the same vein. I was in shaft 19 just once. The shaft in bedrock was about five feet, I should judge, in vein matter. The bottom was not cleaned off. It had caved to some extent,—filled up part of the bottom, you know, so that there was six or seven feet there, I was informed, that had been filled with this cave; that is, of the bottom of the shaft. I saw about five feet of bedrock. The walls of the shaft generally were constituted of this vein matter, which is mostly quartz, in a decomposed state, some of it in the form of talc and some of it in the form of quartz, oxidized matter,

(Testimony of Charles E. Kinman.)

matter stained with the iron. There was no evidence of copper there—green copper, at least, in sight. Might have been some of those stains made by copper. I saw no quartz like the quartz in Defendants' Exhibit 80. It was not that character; this is much harder. Some in 19 is more of a red color. They are both quartz, but there is several forms of quartz. This 80 is very hard quartz. The cave had loosened up everything in shaft 19. After the cave the walls did not show they were composed of broken and crushed material. It was material in place all right, and in the southwest corner of the shaft, there was an exposure of the wall,—of the hanging-wall. [665] The wall was composed of gray granite,—the southwest corner, at the end. It did not show clear across the shaft; it showed about two and a half feet, I guess. I saw no footwall then. I called it the hanging-wall because it was on the hanging-wall side, and was clear granite. It was different from the material on the north side of it; the vein matter under it was somewhat similar. The vein would principally lay to the north,—the bulk of the vein. The vein, part of it, was there. The size of the shaft was in the vein and it extended out a foot or two, where the cave had occurred behind the lagging. I call this vein matter that I saw the vein, since it is between the walls and one wall was in sight, constituted of quartz matter and material,—silicon. I did not state in my direct examination that I could not tell which wall I saw in shaft 19. I am satisfied I saw the hanging-wall; it is on the hanging-wall side,

(Testimony of Charles E. Kinman.)

and not enough of it exposed there to determine its dip or anything of that kind, but it was clear bedrock and granite. This question and answer were asked and given by me in speaking of shaft No. 19: "Q. And could you tell from the work done in the shaft as to which one of the walls it is that is disclosed in that shaft, the foot or the hanging? A. Not from the shaft, as only the top of the wall is exposed. I would not know except by its position and its connection with the other workings along the vein, which wall that was."

Q. Then, from looking at the wall alone, you could not tell which wall it was?

A. Why, yes, by its position, as I tell you, with reference to that vein matter and the slips in the lead are apparent there. I could tell that that was the hanging-wall, and I so answered in that, except from its position, I said. I am giving [666] the same testimony now, but perhaps in a little different words, but the meaning is just as I put it there. I could not determine the dip. There was not enough of it exposed.

In tunnel 35 I found bedrock in the face. There was probably eight feet exposed, which I think was the lead. It was quartz; I mean eight feet in width, where that cross-cut is,—eight or ten feet; I don't know just how long that cross-cut is,—the cross-cut to the north. It was about, I should judge, eight or nine feet down to the bedrock. At the face of the tunnel it is only in bedrock about two feet. The material exposed there was similar to Exhibit 80. I

(Testimony of Charles E. Kinman.)

called it sugar loaf quartz. It carries iron at least. I call it vein matter. When you find that matter you sometimes consider that you have got a vein; over on that ground in controversy you do. In the north cross-cut it all seemed to be that same material. As to the width of the vein,—the wall was exposed on the north,—the footwall,—and to the south there was no exposure. It seemed to be all vein matter; not like Exhibit 80, but similar. It was that sugar-loaf quartz. That is not the material that I call aplite. I saw no aplite on the ground in controversy, but just above there, there was a drift where there was fragments of aplite,—above the Mullins shaft, I should judge a hundred feet, where I picked up one piece. I believe we have some of it here. It differs quite a lot from 80. I believe aplite never carries mineral; there is sometimes a vegetable stain on aplite, but I do not remember to have ever seen a mineral stain.

I was in Tunnel 36. I was in the two cross-cuts. They were in ore, streaks of copper. It is all vein matter. That did not bear any resemblance of Defendants' Exhibit 80. [667] This was another kind of quartz, the kind that is found up all along in the ore shoots. The material found in tunnel 35 is not like the material found in tunnel 36. It was not like that found in shaft 19; it was different character, but I presume on chemical analysis, it would be somewhat similar material. As to in what manner it differed from Defendants' Exhibit 80,—this was green streaks of copper in these north cross-cuts in tunnel

(Testimony of Charles E. Kinman.)

35. They are not as well-defined as they are farther up, but they are the same character of ore and the streaks in it was large. As I remember they were green. I saw no rock in 36 like Complainant's Exhibit 21. That exhibit is aplite in my judgment. There is a wide difference between that and Defendants' Exhibit 80,—not the same character of rock at all. Their texture is different. This cleavage is smooth. This breaks with a rough cleavage. One contains mineral and the other does not contain a trace. 80 contains iron, and that sample there contains not a trace of anything. Defendants' Exhibit 80 is quartz, and Complainant's 21 is aplite.

The mineral exposed in tunnel 36 extends the length of those cross-cuts and out into the width of the tunnel. There was no wall exposed there until you cross the tunnel and go out into a cross-cut to the south or southeast. There you find all granite. I saw no sign of mineralization there, no green stain whatever, that I could detect. I saw there what I considered the wall. The north cross-cut from 37, this all seems to be connected with the Mullins tunnel, underground,—shows the vein. I do not think it is defined. The hanging-wall is exposed there in the north cross-cut. I should judge it was ten or twelve feet from where it departs from the tunnel. I did not see the footwall. The material north of the hanging-wall [668] is all vein matter,—some ore. It did not bear any resemblance to Complainant's Exhibit 21. I did not see anything like Complainant's Exhibit 21 there. The vein matter was com-

(Testimony of Charles E. Kinman.)

posed of green stains made by copper. The stain was upon quartz. There was quite a lot of this green staining there. All the material north of the hanging-wall that I saw was green stained. South of this hanging-wall is granite. It bore no resemblance to that vein filling.

I did not say in my direct examination that in the Hornet discovery shaft I saw a vein carrying some copper stain, and across the shaft, dipping south. I say a vein running east and west lengthways of the shaft, dipping south. It appears in the shaft just below the bedrock, continues down and this brown quartz underlays the hanging-wall, appears near the bottom of the shaft and extends downward.

Q. When you say you saw a vein in the Hornet discovery shaft is that the vein you mean,—this brown quartz?

A. And all the rest of the material in the Hornet discovery is vein matter. It was quartz, all that I took any notes of. I was in there to look at that shaft, to inspect it. I took notice of all of it that was in sight. I found the entire shaft, below the upper cross-cut, in quartz, showing copper, except the brown quartz on the south side. I did not see any vein or stringers running in any other direction in that shaft. At the upper cross-cut, as you proceeded north, you encountered richer quartz. It appeared in the form of green copper and cuprite of copper. It was in stratas; there were no kidneys,—regular streaks except the fault which was in there. The fault is on the east side of the cut. I found the

(Testimony of Charles E. Kinman.)

chrysocolla and cuprite on both sides of the tunnel. Probably the strongest showing of it was on the fault. It was best exposed [669] as it was running parallel with the cross-cut. The wall is not exposed directly south and the course of that cross-cut,—it does not reach the wall,—that is, as far as exposed. The fault does not reach the wall. It ends at the Mullins tunnel at one end, and the other end it is exposed. The end to the south is not exposed. The ground has not been removed, no chance to get at it, no possible chance to see it,—runs up to where the excavation ends. I saw the end of it and it apparently goes on. It disappears in the left hand side of the cross-cut as you go south. I class all the material in that upper cross-cut as quartz. In the upper cross-cut I did not see granite there showing the green stain. I saw no aplite in the upper cross-cut. I went in the tunnel east of the cross-cut. I saw the vein that it had followed along there. In my judgment the footwall was there; the hanging-wall is a long ways off. I picked into the hanging-wall exposed east of the upper cross-cut and east of the Mullins winze, about two feet deep, close to the winze; there was an exposure there, on the east side of the winze. The material was commercial ore. The quartz was carbonate of copper and cuprite. There was no granite there stained by the green copper on that side; there is to the footwall. I picked into the footwall but not at the same point, farther back, before you reach the winze. I found it to be gangue matter, as I would call it, it come from the footwall.

(Testimony of Charles E. Kinman.)

I went through that into the granite. I did not find the granite at that point. The granite wall is exposed near the mouth, near the face of the tunnel. This becomes harder as it gets underground. Footwalls are generally soft,—in soft formation. Near the face of the tunnel I found the hard granite footwall,—it was straightening up, getting in shape. I think it was the same wall I saw at the Mullins winze and all [670] along the tunnel. My observations there led me to conclude that that Mullins tunnel was run principally in the footwall,—along the footwall and in it, cutting it. I could see it in the back when I was in far enough. As to there being any ore on the north side of that footwall,—there was spots there,—little kidneys of ore, all right, the gangue accompanying the footwall that appears in most leads,—such things. You would not see these little kidneys of ore in the upper cross-cut. They were stringers. I did not see kidneys in there. The kidneys in this footwall were of various sizes. Some the size of a marble and some the size of this sample 80 you have here. It was a kidney with no stringers extending from it. I could not tell how thick this soft gangue matter on the footwall was; but I should judge that the tunnel had cut away a lot of it. I judged it had originally been three or four feet. I am satisfied that that was the footwall in there. In fact, I have encountered many footwalls that presented that. As to picking into the hanging-wall at any other point save immediately east of the Mullins winze—I do not know of any other point where the

(Testimony of Charles E. Kinman.)

hanging-wall is exposed. The hanging-wall is not exposed in the Mullins shaft, in the tunnel. I did not pick into the hanging-wall in there. I picked into the ore body. It stands like a wall. I picked into it at the face of the tunnel. I picked into it I guess probably three or four inches. The material was the same as back,—quartz, heavily charged with copper. There was no granite stained green with copper on that side. It appears to be richer the farther in there I got, in the tunnel, more copper, of the green stain and also of the cuprite. I mean to say there is cuprite in that lead that stands like the hanging-wall in the Mullins winze. I exposed it there; it was in [671] little cubes; some of them the size of a buckshot and some of them the size of a dime, around through the material that stands like a wall.

Redirect Examination.

(By Mr. NOLAN.)

The WITNESS.—I stated that samples of aplite were obtained some little distance from the Hornet shaft. These that you show me seem to be samples of that material. I would call that aplite. It is devoid of any mineralization.

(Sample offered and received in evidence, and marked Defendants' Exhibit No. 95).

Recross-examination.

(By Mr. BOURQUIN.)

The WITNESS.—The pieces composing Defendants' Exhibit 95 came above the lead about a hundred feet; a hundred feet above the Hornet tunnel. I did not get them myself; Mr. Mason did. I saw them.

(Testimony of Charles E. Kinman.)

They are the same pieces. They are aplite. I think they are different from Defendants' Exhibit 80 besides their having no staining of the iron. Their texture is different. I think Defendants' Exhibit 95 is composed of feldspar and some silica, some oxygen, hydrogen. I don't know what else. Defendants' Exhibit 80, the rock itself is composed of the element Silicon and silica; it is ore,—silica. I do not see any silicon in Defendants' Exhibit 95. There is a little silica there, I think. As to the difference between silicon and silica,—in chemistry, the element silicon is one of the elements of nature, and silica is one of its,—principal ore as we would say. There is no feldspar in Defendants' Exhibit 80. 80 is known as sugar loaf quartz.

[Testimony of Daniel J. Williams, for Defendants.]

[672] DANIEL J. WILLIAMS, duly called and sworn as a witness on behalf of the defendants, testified as follows:

Direct Examination.

(By General NOLAN.)

The WITNESS.—My name is Daniel J. Williams. I have lived in Butte about eight years. I am engineer for the East Butte Copper Mining Company. I have worked for the company in different capacities for about seven years, going on four years, nearly four years, as mining engineer, for the East Butte Copper Mining Company,—the Pittsmont mine, chiefly. My labor is especially devoted to the Pittsmont mine. The Pittsmont property was taken over

(Testimony of Daniel J. Williams.)

by the East Butte; so I have been with that same mine all the time off and on, seven years,—four years as mining engineer. The Pittsmont mine was operated by the Pittsburgh and Montana Copper Company before it was taken over by the East Butte Mining Company. When the Pittsburgh and Montana Copper Company operated the Pittsmont mine I was engineer. First I worked there as a miner and then I became assistant engineer and then chief engineer. After the property was absorbed by the East Butte Mining Company then I continued in the employ of that company. My operations were chiefly confined to the Pittsmont mine. I had to do with the mining operations that were carried on, and with the leads that were being worked by the company. I know there are leads traversing the property of the Pittsmont company running easterly and westerly.

I have been upon the ground in controversy here very little.

Q. You have been on the ground, however, a couple of times, have you not, and made observations as to this southerly lead, so designated on the map, Defendants' Exhibit 1, going through the Rabbit discovery and westerly, and to shaft No. 21. You [673] have seen that so-called lead, have you not?

A. I saw it in the tunnel. As I understand, this line on your westerly line and our easterly line coincide. I know where the northwesterly corner of the Butte and Boston placer ground is.

Q. And I will get you to state whether or not your

(Testimony of Daniel J. Williams.)

ground,—the easterly portion of your ground,—extends in a northerly direction as far as this northwest corner of the ground in controversy.

A. Well, our ground comes that far; this comes back. It goes due west about six hundred and sixty feet, and then due north.

The veins that exist on our ground do not come to the surface; there is considerable overburden; by that I mean a deposit of wash. In this country here we have an easterly and westerly vein, (indicating on map). I have reference to the ground lying to the west of the Butte and Boston placer. All of our veins in the eastern portion of the mine dip towards the north. It has been opened up for a distance of about three thousand feet. They come on that vein, on the twelve hundred foot level, and within about four hundred and fifty feet of our east line on the twelve hundred foot level, and on the eight hundred foot level, we have come within about seven hundred feet of the eastern line. We stoped that vein from the eight up to a hundred and forty feet above the eight, and there encountered the wash. I would say the depth of the wash at that point would be about six hundred and sixty feet. I believe that the wash is not quite as deep in the western portion. We have not gone that high on the vein, so I could not just exactly tell you; but I know on account of the oxidized,—about twenty to thirty feet above the six hundred. The lead as developed in [674] its westerly strike only has about one main fault. It is about the middle of the lead on its strike. The dis-

(Testimony of Daniel J. Williams.)

placement where that fault occurs is about twelve feet; it is thrown toward the north. This displacement occurred equally in all of the levels where the working has been carried on. Taking the lead average for three thousand feet, its strike is practically due east and west. I mean by that, if you take its co-ordinate at the eastern end of the vein, and its co-ordinate at the extreme western portion of the vein, its distance north from the base will be practically the same. This vein, you understand is sinuous. It varies back and forth, but take its position clear across the map, it is practically east and west. The vein is wider in places than in other places, and the strike varies. The average width of the vein would be about five or six feet. The dip of the vein is variable also. At the extreme western portion of the mine, its dip is about fifty eight degrees to the north. As it comes easterly, it gradually straightens up, until, at the easterly most portion of the vein, it is about,—well, it varies from eighty to ninety degrees, straightens up almost vertical in some places. When the dip is ninety degrees it goes vertically into the ground; when it is eighty degrees, it is ten degrees from a vertical line. On its easterly course this vein has been explored to within about four hundred and fifty feet of the ground in controversy. The lead at that point is quite strong. It is not as wide as it was in other portions of the mine. The lead does not give any evidence of petering out or disappearing at that point.

Supposing that I would run a verified line to the

(Testimony of Daniel J. Williams.)

surface from the point where the lead exists, at a distance of four hundred and fifty feet from the ground in controversy, I would designate the surface point with reference to the northwest [675] corner of the ground in controversy, at about three hundred feet or four hundred feet from this corner. I mean I would measure three hundred and fifty or four hundred feet south. I have indicated on this map with this red mark where the letter "o" of north of No. degrees on the ground in controversy, on Defendants' Exhibit 1.

Q. Now, I understand that in projecting this line as you did, you did not calculate at all the dip of the lead, at the point where you projected the line to the surface. You simply run a vertical line?

A. Yes, just roughly from the eight hundred foot level. On our ground at that point the material is quartz, pyrite, and chalcocite, probably some enargite. The entire vein was in the sulphide zone. We mined the sulphide zone out. We encountered the wash where it was oxidized, where it cuts out the vein. It is all sulphide coming up until you get to the oxidized zone. The lead is in the oxidized zone before you strike the sulphide ore for about eight or ten feet.

All the veins that we have worked, that we consider commercial ore, dipped toward the north, in the eastern portion of the mine.

There is another lead in the easterly portion of our ground, northerly of this that I have marked on the map, with the dip to the north. That lead has a

(Testimony of Daniel J. Williams.)

different strike than this vein. It is northeast, about sixty-five degrees. The lead to the north of this would run northeasterly and southwesterly. It intersects this one here, about the center of the property.

I believe there is a vein on the ground to the south of this lead that we are considering, whose strike is southwesterly and northeasterly, but I never have seen it.

Our ground in its northerly and southerly course does not [676] extend more southerly than corner No. 8 of the ground in controversy; those two corners coincide.

The lead material that we encounter in this lead to which we are referring that has been marked by me upon the map here,—at the point where it is last disclosed in our ground it is about a foot and a half wide. At that point it has a dip of eighty degrees to the north. We followed it on the eight hundred, and stoped up a hundred and forty feet above the eight hundred foot level. As to whether or not the lead that is exposed there is this lead that is exposed in the tunnel on your ground, in its westerly course,—that is quite a ways to project a vein, but it is possible that they are one and the same. I think they are.

Cross-examination.

(By Mr. SHELTON.)

The WITNESS.—I am a mining engineer. My experience as a mining engineer has been solely with the Pittsburg and Montana Copper Company and

(Testimony of Daniel J. Williams.)

the East Butte Copper Company. Previous to my entering their employ I had taken a course in a college. My duties in connection with the East Butte Copper Company,—I do all the surveying, the mapping,—the last two years, I have been doing the geology, mapping the leases, laying out new development, and so forth. Mr. J. H. Warner is also in the employ of the company as a geologist. The Pittsmont mine has been turned over to me,—the geology of it. He and I, either one, I would not know which is the boss, as you might say. He has been doing outside work and I have been doing the mine work. I mean by outside work, traveling around and looking at other properties. To the extent of mapping the veins, platting them, and so forth, I am a mining geologist. I have been [677] engineer at the Pittsmont mine nearly four years. Prior to that time I worked as a miner and I worked as assistant engineer, I worked there during one vacation as assistant engineer,—I think it was May the 1st until September the 1st, if I remember. That was not immediately preceding the time when I became chief engineer. I continued with the School of Mines and worked out there Saturdays and Sundays and evenings, drafting, and so forth. When I worked as a miner, preceding that time, I became acquainted with the underground works or workings of the mine. I might say the beginning of my studying of geology goes back about ten years,—back to my high school days,—I read on the subject several times since, and in the School of

(Testimony of Daniel J. Williams.)

Mines here in Butte, I had a course in geology and mineralogy. The work that I have done as a geologist consists of mapping and tracing out veins and making a study of them generally, and has been confined to the Pittsmont, and also the East Butte mine,—chiefly to the Pittsmont.

The vein that I referred to that has a length as developed of about three thousand feet is known as the Donner vein. That vein has been traced right to the Silver Bow. That is the vein that I said might possibly be connected with the vein shown in tunnel 31, on Defendants' Exhibit No. 1. As to how much of a variation that vein has upon its strike from a due east and west course—taking the whole thing, three thousand feet, there is practically none at all. The greatest divergence from an east and west strike, going north, in the course of the vein, is about twenty degrees. The vein gets about forty feet south of an east and west line. It gets about forty or fifty feet north of such a line. It is a very hard question to answer how many other veins there are in the easterly portion of the Pittsmont ground. I have never counted them. I [678] think probably there might be fifteen of those streaks or veins. As to how many veins having a width of eighteen inches in the eastern portion of the Pittsmont ground, or the ground of the Pittsmont Company that lays west of the ground in controversy in this case,—practically in that ground, there is only one vein that is really a vein with commercial ore in it. There are others that have not commercial ore; they are just little

(Testimony of Daniel J. Williams.)

stringers; we would hardly call them veins,—might be called veinlets. They are a couple of inches wide, and from that up to eight, ten inches. They dip toward the north. All of the commercial veins in the eastern portion of the Pittsmont ground dip toward the north.

As to how many veins there are within a distance of a thousand feet going to the north, in the Pittsmont ground, which lays north of a line drawn through the northwest corner of the ground in controversy,—disregarding little veins or stringers, I know of six veins that are pretty good veins. The six carry commercial ore. They dip toward the north. The first one comes up here about four hundred feet, I should judge, from an east and west line running through the northwest corner of the ground in controversy. The strike of that vein is north sixty-five east and west,—northeast and southwest. Its widest place is thirty-six feet and from that it runs down to five or six feet. We do not work the oxidized zone at all. That vein has been developed up to about a hundred and sixty feet above the eight hundred foot level. That is the oxidized zone. I could not say how far above the permanent water level that is. I do not know just exactly where the permanent water level is. There is about twelve feet of that one hundred and sixty feet in the oxidized zone. As to the character of the vein material in that vein above or within the oxidized zone,—right at the [679] extreme back, it is native copper. That has been the chief source of the copper, the metallic copper.

(Testimony of Daniel J. Williams.)

Right in the back of the stope. It is native copper. Below that it is chiefly enargite quartz and pyrites. They are sulphide ores. The character of the vein material in the Donner vein within the oxidized zone it is mostly iron. You would say there is no mineral in the oxidized zone. All of the copper has been carried down below. This vein with the northeast and southwest strike is called the Motheral vein.

Q. How near to your east end line has your development work progressed on the Motheral vein?

A. You understand now, this end line drops back about six hundred and fifty feet, and within that, about five hundred feet.

The development has been carried from the twelve hundred foot level. In the eastern portion of the mine the dip is about seventy to eighty degrees. In the extreme westerly portion of the mine, the vein gets flatter, about sixty-five. It dips to the north. We have not developed the ground that you indicate, between the extreme point of development on the Motheral vein, and tunnel No. 31, on Defendants' Exhibit No. 1. I do not know whether there are any faults in there or not. As to the ground to the east of there, I have been through there, but I never took any notice as to faults. I know of the fault known as the continental fault. I believe it is somewhere in here (indicating on map).

Q. In a north and south direction?

By General NOLAN.—Object to that as not cross-examination. All of this I object to as not proper cross-examination.

(Testimony of Daniel J. Williams.)

Q. Now, as a geologist, will you expect to find any parallel fractures, considering the nature of the ground in that vicinity,— [680] any parallel fractures to the continental fault?

By General NOLAN.—Object to that as not proper cross-examination.

Q. Well, there probably would be, yes.

Q. Does the slope of the bedrock to the west, from the continental divide, indicate to you that there might be faults having a northerly and southerly strike, running through that ground?

By General NOLAN.—Object to that as not cross-examination.

A. I have never noticed any.

Q. Well, as a geologist, would you conclude from the slope of the bedrock, that there might be such north and south faults?

A. I cannot see the back. I know roughly what the slope of the bedrock is. It is higher at tunnel 31 than it is on the Donner vein, at the point where I found bedrock. The difference in elevation is about six hundred feet. The distance between tunnel 31 and that place where I say I encountered wash on the Donner vein or above the Donner vein, would be about eighteen hundred feet.

Q. Well, does that slope of the ground there indicate that there might be faults traversing it?

By General NOLAN.—Object to that as not cross-examination.

A. Where do you mean?

Q. Well, I have asked you about two points. I

(Testimony of Daniel J. Williams.)

have asked you about one on the Donner vein and one at tunnel No. 31. Now I am asking you whether or not the slope of the bedrock in the western direction, as you have described it, would not indicate to you as a geologist, that possibly north and south faults are traversing that ground?

A. No, it would not.

[681] Do you think that the elevation of the mountains to the eastwardly resulted in certain faults parallel with the general course of the mountain range?

A. I think that sloping down to our ground is due more to the erosion, for the Woodville Canyon slopes down that way,—the former creek flowing through that way probably cut away and formed the bank, and that surface going down that way is just the bank of that former creek, filled up with wash. It would not necessarily follow that if there are any faults running through that ground, they would have the effect of displacing any veins which traversed it in an east and west direction. The movement may be up and down, and no lateral movement. I could not say as to whether there are any faults within that ground between those two points. We have not developed the ground.

Q. And if there are any, can you give us any opinion as to the extent of the displacement of the veins?

By General NOLAN.—Object to that as not cross-examination, and really as encumbering this record.

A. I cannot. I was in tunnel No. 31. I did not take

(Testimony of Daniel J. Williams.)

any particular note of the ground at all. I just went through there. There are two little faults. I did not spend enough time to take any notes of the faults at all. I just simply walked in there and turned around and walked out. I did not take any strike of the vein; I just noticed it with my eye. I did not use an instrument. I should think the strike of the vein was about east and west. I am pretty sure it would not be northeasterly and southwesterly,—it might be. I say it is generally easterly and westerly. I do not know whether it is as much of a northeasterly strike as the Motheral vein. I do not think it would be [682] because the Motheral vein is about north sixty degrees east and west, and I am quite sure, from what I saw, it would not be that much. It would be more easterly and westerly. As to the vein disclosed in tunnel 31 being the same as the Donner vein—I remarked that it was possible. I agree with you that it is rather far to project a vein, but I think it is possibly the same vein. It could not be the Motheral vein. I do not think it could be some other vein shown in the Pittsmont ground. I do not think it would run entirely south of our workings on the Pittsmont ground. It might peter out before it got as far west as the Pittsmont ground. I don't know. I am just simply correlating—taking a line right over here and drawing a line; it is possible, you know, that would figure out those things,—we figure out those things, in fact, greater distances than that sometimes, in the Pittsmont ground itself. We have correlated a greater distance than that in

(Testimony of Daniel J. Williams.)

the Pittsmont ground and established a vein. We have developed that Donner vein for three thousand feet of the vein. I said that we have at times projected other veins for a distance of over a thousand feet and struck the ore. We have not any reason to project that Donner vein. You see we follow that vein right along all the time, but I am speaking of ore,—now, it is possible sometimes to project veins a thousand feet or more, with a certain degree of accuracy.

I marked the point "C" on the map, Defendant's Exhibit 1. It is about three hundred and fifty feet south of the northwest corner of the map,—of the ground.

Q. An east and west through that point would pass through a line projected upward from the eight hundred foot level of the Donner vein, would it?

A. Well, I projected this east from the eight hundred foot level of the Donner vein, assuming the vein to be vertical. [683] As a matter of fact it has a dip of about eighty degrees. It straightens right up.

The point "C" is about a hundred and forty feet above the eight hundred foot level of the Donner vein. The eight hundred foot level is eight hundred feet from the surface of the ground. This point "C," you understand, is vertically right over, about, the eight hundred foot.

Q. Yes, but you are to determine the strike by projecting the line up within your east and west lines, for the purpose of projecting the vein. You have

(Testimony of Daniel J. Williams.)

taken into account the difference of the elevation of the surface?

A. Not if it is vertical, it would make no difference, because no matter what the elevation of the ground there would be, it would go right over above there. The vein is not so near the vertical on its dip that I disregard the departure from the vertical. It is not that near the vertical. I say it was speaking of the vein the way it is,—because up,—it comes up from the twelve to the ten, and the ten to the eight, and so forth. This vein is continuously straightening up, and I thought,—we thought, it would be continued on,—if it had continued on, and the ground had been there, which it originally was, as the bed rock, the vein would have come to the surface practically vertical. That vein is, generally, getting straight all the time. At the eight hundred it did have a dip. If you are to determine this point on the surface, where you look at the apex of the vein, you have to consider the dip. If we had considered the dip it would be, I think about eighteen feet off from a hundred feet of the elevation, where we put the apex of the vein. That would make the apex about a hundred feet further south. You also have to consider the difference in elevation between your ground and the point “C.”

[684] Q. And that would throw it another twenty feet farther south, and that would make your apex a hundred and twenty feet south of that vertical line projected to the surface from the eight hundred foot level?

(Testimony of Daniel J. Williams.)

A. Yes, possibly that. I disregarded that; I considered the thing as a straight—

Q. When you answered Colonel Nolan's question, you said it was four hundred and fifty feet south; putting it on the map, you put it three hundred and fifty feet south,—why did you do that?

A. That is the first thing I thought of— That would not add still another hundred feet. I said three hundred and fifty to four hundred.

Q. That would add another fifty feet. If you add that fifty on the hundred and twenty feet which you disregarded on account of the dip of the vein, you would put your point a hundred and seventy feet south of the point "C," would you not?

A. Well, let's see. I would consider the dip of that vein as being eighty degrees; about six hundred feet; it would come south a hundred feet. That would be one inch on that map, south of the point "C."

I did not make sufficient examination of tunnel 31 to ascertain whether or not the vein on its strike would run up to the point marked shaft 1 and 2 and tunnel No. 30. If it had any such strike, it might possibly be the same vein as the Donner vein; it might be in the broad sense of the word. It is possible to correlate it, but still I do not say it is the same vein. It is apt to be the same vein. If this vein disclosed in tunnel 31, runs through shafts 1, 2 and tunnel 30, and then continues on down through shaft 9,—as I illustrate, I would not consider that would be the same vein.

(Testimony of Daniel J. Williams.)

[685] Q. Assuming that the vein shown in tunnel 31, also in shaft 9, through shafts 1 and 2, and through tunnel 30, then what would you say as to its being a continuation of the Donner vein?

A. Well, it would look to me as though if it went through those points, it would be the Donner vein, if that is really the strike as you have given it.

Q. If you were to assume that the Donner vein is the same as the vein shown in tunnel 31, wouldn't you expect to find the strike of the vein in tunnel 31 about like the course of the red line on the map, Complainant's 14?

A. No, I would not necessarily, because the strike of the Donner vein varies considerably,—varies as much as twenty degrees,—but its general trend is due east and west, but right on our eight hundred level, and about seven hundred feet from the end line, the strike is north about seventy-two degrees east.

Q. That is your projected line on that strike, along the apex of the vein,—that line would connect pretty well with the red line in tunnel 31 on the map 14?

A. You mean this streak of ore here. That would be seventy—or seventy-two degrees, I would suppose. Of course, in projecting a vein, you generally take its width and length and not any particular position on that vein, take the general trend of the vein, because the vein is sinuous,—travels along in a crooked line.

I believe the position in the Pittsmont ground of veins known to exist in the west—to the west of the McQueen placer, was determined before my time. They were probably successful in finding the eastern

(Testimony of Daniel J. Williams.)

continuation of those veins. None of those veins are being developed at the present time; they were not commercial. I believe it is true that some of them they did not find at all. I believe the north cross-cut was run about twenty-six hundred feet north of our No. 3 shaft. [686] I believe the McQueen placer extends clear on our property, all the northern portion is on the McQueen placer. There is a fault about the center of the ground that is known as Application 888, running north and south, having a dip toward the east; I think the dip is about seventy degrees. The width of the fault between the walls is about sixty feet. The vein penetrates right through the fault. The fault is cut by the vein; you could put it that way. The fault is younger geologically, probably, than the vein. There is not any dislocation of the vein there that I know of. The dislocation of the vein that I speak of—we don't know whether the Motheral vein goes through that fault, or just where the fault is yet. The fault that makes the twelve foot throw is at the intersection between the Motheral and Donner veins. It is supposed to be a compound fault. The Motheral slips on the Donner and the Donner slips on the Motheral. I think the Donner is the younger vein of the two. The Motheral strikes north sixty east—that fault has nothing to do with the other fault at all. There are other minor faults in the property except the sixty foot fault and the fault that takes place of the intersection of the two veins that I mentioned. There is a very small throw of the other faults. As to which

(Testimony of Daniel J. Williams.)

way the throw is,—if you are driving on the vein, the general rule is to turn to the left. If you were driving toward the east, your vein would be to the north, and this fault would turn the vein to the north. As to the dip of those faults, they vary; some of them are vertical; some of them are sixty or seventy degrees. I believe as a general thing they all dip to the east. In testifying this morning about a twelve foot throw to the north I did not refer to the fault of the sixty foot width; I referred to the Donner itself,—the Donner vein itself. The westerly portion is to the north. There is a dislocation of the Motheral vein at that intersection of [687] about fifteen feet. As to the throw,—in going east you would turn to the north there,—just the reverse of the other.

I have located a point on the map one inch south of the point “C” by the marks “C—1.”

Redirect Examination.

(By Gen. NOLAN.)

The WITNESS.—I did not make a very critical examination of the lead as it was disclosed in the openings on the ground in controversy; I simply saw the lead there without examining it as to faults or the size of the faults or anything of that kind. I believe the lead exposed in this tunnel and in those openings to the west is the Donner lead as it is projected into our ground. That is simply my opinion. There is about fifteen or sixteen hundred feet of virgin ground there where the lead is concealed from view. As to what may occur in that sixteen hundred feet I do not undertake to tell. There may be faults and there

(Testimony of Daniel J. Williams.)

may not. If there is a fault throwing the lead in one direction there might be a fault throwing it in the opposite direction as you go farther on. The only way you can tell about those faults is by actually seeing them in the ground and seeing what the effect of their work is. I give my judgment as I have given it in the light of the exposure of the lead for three thousand feet in our ground.

I have spoken of the Motheral vein. That is a northeasterly and southwesterly strike. By reason of the difference in the strikes of the two leads they intersect somewhere on our ground. We figure that the Donner lead is the younger one of the two. We do that because the vein that is usually displaced is usually taken to be the older. In this case it is the Motheral lead that is displaced by the Donner lead; and in turn the Donner is displaced by the Motheral. It is a case of [688] compound faulting. The eastern portion of the Motheral lead as it is known to us would be about a thousand feet west of the ground in controversy, and about four hundred feet north of corner No. 1 of the ground in controversy. The Motheral lead dips toward the north. In determining the strike of the lead it is supposed to be the better method to ascertain the course of the lead for as long a distance as possible. In that particular instance, with the Donner lead exploited for a distance of a thousand feet, I would say that the lead is almost due east and west. Taking some portions of it, the strike might be suggested as northwest, and taking other portions of it, the strike southwest might

(Testimony of Daniel J. Williams.)

be suggested. Taking the entire distance of three thousand feet I would say that the lead is east and west, with a little to the north as you go west.

There is also a deviation in the dip. As you go east and you approach the apex of the lead, it becomes almost vertical. That was the reason why, in figuring as I did, I figured vertically without considering the line of declination of the dip at all. Having the bedrock within ten or twelve feet of the surface in tunnel No. 30, and having the bedrock a distance of a hundred and two feet from the surface in shaft No. 21, that would suggest that there is quite an inequality in the surface of the bedrock. I would not attribute that inequality to faulting; I think it was due to erosion,—due to that former canyon where the water flowed down through the canyon. I could not tell you whether at the time that this granite is brought up, or becomes solidified in the position in which it is there, that it was perfectly flat on the surface. It is possible that it would incline. It might be a curved surface, not necessarily a flat surface; or it might be cup shaped; the outline is variable.

[689] These faults, for this distance of three thousand feet, did not accomplish very much in the displacement of this Donner lead. There is in the one instance displacement of twelve feet, and then in the other instance, you get through them without noticing particularly any great displacement of the lead. This Donner lead furnishes commercial ore.

As to any leads on our ground south of the Donner lead,—I believe the records show that there is a

(Testimony of Daniel J. Williams.)

southerly lead south, but that is possibly used for a tank, for storing water,—sort of a reservoir,—and that is now caved, and I have never been down there. I don't know anything about it personally at all. They have a sketch out there showing it, but how accurate it is, I do not know anything about. I have a map showing the course of this Donner lead. Mr. Barker examined that map. As to that map being correct, so far as the workings in our ground is concerned,—we checked our map with the Silver Bow people, on the connections of the mine, so it is pretty near accurate. The workings within our own ground are all O.K. so far as we know. The Donner lead in the eastern portion of the ground, as far east as it is exploited, is shown correctly upon the map that I showed to Mr. Barker. The greatest width of the Donner lead in its course during those three thousand feet would be about twelve feet; and the narrowest is eighteen inches, I believe. It is narrower in the eastern portion.

Recross-examination.

(By Mr. SHELTON.)

The WITNESS.—Where we have opened up the eastern portion of the mine it is narrower than in the western portion, although we have a narrow portion in the center of the mine. It is in and out. Just to the east of the ground in controversy is [690] the summit of the main range of the Rocky Mountains. The top of that continental divide to the bedrock at a point four hundred and fifty feet west of the east end line of Application 888 would be about sixteen

(Testimony of Daniel J. Williams.)

hundred feet. I do not know whether that difference in elevation is due to the elevation of the land originally, on account of the shrinking of the earth's crust. I do not know whether that was the original or actual position of the bedrock there. I do not think anybody else does exactly. I think there are several theories advanced as to that, but I am sure I don't know.

The strike of the Donner vein for about three thousand feet is easterly and westerly,—about due east and west. As to that warranting any belief that it will continue on that strike for any distance to the east,—in the absence of any definite proof I think we would consider it as continuing on. I do not know, at the same time, I think of it as a possibility. I don't know; no one else knows, until we develop that ground. On the short distance on the course of the vein, it varies as much as twenty degrees. It may continue on the remainder of its course either on a northeasterly or southeasterly strike. It has not been our case out there that veins continue for a long distance on a regular strike and then depart from that strike for the remainder of its course. They are usually pretty well defined. They vary a little in and out, taking it over a great distance of three thousand feet, it is pretty apt to continue on. In fact, we would consider it to be the case until it is absolutely shown not. That is our way of looking at it. I am only generally acquainted with the strike of other veins in the district outside of those shown in the Pittsmonth property. As to the average dip

(Testimony of Daniel J. Williams.)

of the Donner vein for this three thousand feet,—the extreme western portion of the mine, [691] it is about sixty degrees, and the extreme eastern portion about eighty degrees. The average would be seventy. I do not take the seventy as being the average because the vein is pitching up. In the extreme western portion of the mine the dip is practically sixty degrees to the north. In the eastern it is eighty, but there is a continual straightening up. I believe it would continue to straighten up as you proceed on the easterly course of the vein.

Q. Well, it has a northeasterly strike at the eastern extremity of the vein. Do you expect it will continue on that strike, or do you think it will return to a southeasterly course so as to bring up the average?

A. Judging by its past behavior, I should judge it would turn around and go east again. In order to reach its east and west course it would not have to go southeast. It is striking northeast and southwest at the *git* hundred, and then she turns and goes northwest, and then southwest, and then northwest, and then southwest,—back and forth,—as we drove westward on it. As you come east from the place of present development I think it would turn again to assume the normal course. That would not bring it farther south again,—simply turn and go back, and turn and go back, and turn and go back. At the present time it is not north of its normal position. It is exactly right. The center of the vein is all right; where the cross-cut pierces the vein here, that position toward the west end of the mine is very close.

(Testimony of Daniel J. Williams.)

Q. Well, the dip there is about eighty degrees, and if you undertook to determine the position of the apex, you would have to project your line to the surface on that dip?

A. Well, I believe you would. We would use that raise for general direction, for no one place. It seems to be about eighty degrees. I think possibly the vein at one time came [692] up higher, but the way it is going now, I predict the line would be vertical over the nineteenth floor.

As to the lead disclosed in tunnel 31, and a lead disclosed to the west there,—I believe there is a slight indication in there somewhere. I do not just remember. I was down in one of those holes, but I do not remember just which one it was. I did not see anything else that I thought looked like the Donner vein. I made a very superficial examination.

I do not know anything about there being displacement by faulting east or west of the three thousand feet.

Redirect Examination.

(By General NOLAN.)

As to the lead existing to our knowledge a distance of three thousand feet, I would consider it as continuing on east and west until it is absolutely shown that it is not.

I stated that sometimes we project lines where the solid ground exists for the purpose of determining the location of the lead, a distance of a thousand feet. In those instances where these projections have been made we have found the lead.

(Testimony of Daniel J. Williams.)

Recross-examination.

(By Mr. SHELTON.)

The reason that we project a line is because we have no better means of determining the place to look for the lead. We very rarely find it exactly where we figure on it; it may vary considerably.

I am not a graduate of the School of Mines; I went within three months of graduation. I did not graduate.

**[Testimony of Louis Mason, for Defendants
(Recalled).]**

[693] LOUIS MASON, heretofore duly called and sworn as a witness on behalf of the defendants, being recalled, testified as follows:

Direct Examination.

(By General NOLAN.)

I got the samples, Defendants' Exhibit No. 95. I obtained those samples in three different points. One piece came from off of the ground, about a hundred feet in a northerly direction from the Hornet shaft. It is one of the small ones, I could not say exactly which. I obtained two other pieces from off of the BIRTHA quartz mining claim, situated east of the would be Butte and Boston placer. And another piece from off of the adjoining quartz claim, situated east of the BIRTHA, known as the Pacific quartz claim. The one piece taken from the Pacific, was out of a shaft that had been sank down, I could not say how deep it is, filled up at present, and I took it out of a piece of this dump that was thrown out in exca-

(Testimony of Louis Mason.)

vating the shaft. The piece that I obtained in the ground in controversy was a piece from off of the surface, a piece of aplite. It was lying on the surface of the ground. As to the piece that I obtained from the BIRTHA, that was taken from a place where there was quite a dump. This dump was made in excavating where the road was cut out, that led up to an ore bin on the BIRTHA. I have been on the ground repeatedly since I was on the stand before. I have taken a number of witnesses on the ground and showed them the openings on the ground,—witnesses who have testified here. The numbers of the shafts and the openings they gave were correct to the best of my ability, as the numbers appeared there.

Shaft No. 21 was sunk by me with the other party assisting me. That was sunk the latter part of the summer of 1911.

[694] Q. How was it that you came to sink the shaft at that point, why didn't you sink it farther to the north or farther to the south?

A. I put up a stake between the Rabbit Discovery and shaft No. 9, I also set another stake over the north end of the north cross-cut leading north from the Rabbit tunnel and there—

By Judge BOURQUIN.—Tunnel 31.

A. Tunnel 31, yes, sir. There was a hole pierced through from this cross-cut to the surface. I cut a stake up there and sighted from the stake between shaft No. 9 and the Rabbit Discovery, and this stake at the north end of the cross-cut, or tunnel 31, and sank this shaft down here at the most westerly work-

(Testimony of Louis Mason.)

ings, to a depth of a hundred and ten feet. As to what I expected to accomplish in getting down to bedrock there, with reference to encountering any vein—I judged by the vein, vein very near vertical, and the strike of it a little north of west, and by lining and sinking where I did, I ought to come down on the apex of the vein. The entire bottom of the shaft, from the time I came to bedrock, is in vein matter, and I judge as good a showing as the apex or outcrop anywhere in the district. As to the character of the material in this vein that is disclosed there,—there is tale in it, and iron, quartz and such material as you find in the apex of the veins in this district. I have a sack here that fairly represents the bottom of the shaft as you see it there now. In obtaining this material for the purpose of showing the character of it, I did not take it from any particular spot. It would be difficult to say over how much territory I travelled in getting the material that I have here as a sample, because as I hoisted it out of the shaft, I dumped several buckets of the largest of my work on the top of the dump for the purpose of taking a sample from, and this sample represents those several buckets that are dumped [695] on the top of the dump. There is sufficient exposure of lead matter there, or vein matter, so that I would be able to give an idea as to the strike of the lead or as to the dip of it. In sinking in bedrock, the long way of the shaft is north and south, and the lay,—I usually sank down eighteen inches or two feet at one end of the shaft and then would excavate that depth out across the shaft, and

(Testimony of Louis Mason.)

the lays of the ground were from the south to the north, indicating the dip to the north and the stratas from east to west. I was not able to tell definitely the angle of the dip. I should judge it would be somewhere in the neighborhood of sixty degrees, judging from the red streaks that pass across the shaft from east to west. I never had a compass or instrument to indicate the dip. In the examination that I made there of the bottom of that shaft there was nothing to suggest the existence of a north and south fault. I sank the shaft myself, and if there was any indication, I would tell you so, and it is there for examination by any man. This is the sample that I took from the bottom of the shaft. As to these samples, there is a piece I should pronounce quartz. That is also quartz. There is some dry, talcy substance, also. There is another piece I should pronounce quartz. You can see where the mineral or iron has oxidized out porous. This larger one of the series is such matter as you usually find in all of the veins, I think, in Butte, near the surface,—at least, I have met in most all that I have worked in. I do not think there is a gentleman in the courtroom or anywhere, that would pronounce that other than vein matter, such as we find in the oxidized zone in the veins in Butte.

(Sample offered and received in evidence, and marked Defendants' Exhibit No. 96.)

[696] That is the most westerly opening on that lead, on the ground in controversy. I should judge it to be about eight hundred feet, not measuring it, but approximately about eight hundred feet east of the

(Testimony of Louis Mason.)

west end line of the Rabbit, and approximately the same distance east of the west end line of the Olivia; and about two hundred feet south of the north side line of the Rabbit and the Olivia; and about four hundred feet north of the south side line of these two claims.

As to Tunnel No. 30, that is a tunnel that has been drove in the mountains, in an easterly direction, for a distance, I should judge, of about a hundred and twenty feet. It was driven by myself and others employed with me. I think the last work was done in that three years ago. In driving that tunnel we encountered bedrock. The last fifty feet, I think of the tunnel, or, in other words, fifty feet from the breast of the tunnel, west toward the entrance, is in bedrock. There is also a cross-cut to the south in that tunnel, and also a cross-cut to the north in that tunnel. I should judge the face of the tunnel was about twelve feet below the surface of the bedrock. Of course, that has not been measured, but judging from looking at it, it would be in the neighborhood of twelve feet. The back of the cross-cut running to the north shows solid rock, and the cross-cut running to the north from the tunnel is all in a blocky, coarse, hard formation, that is, the ground breaks out blocky and hard. From the tunnel south, the ground is of a yellowish cast, iron stained, and more soft, sugary-like, sugar quartz, commonly called, in the entire distance of the south cross-cut. The rock in the face of the tunnel is not stained with chrysocolla. Neither the rock in the face of the tunnel nor

(Testimony of Louis Mason.)

the rock in the cross-cut running north is stained with [697] copper, whatever, that I seen, and I do not remember that I saw copper stains even in the south cross-cut. While it is lead matter, in my opinion, unquestionably, in the south cross-cut, but we do not always find copper in any form in the apex of the veins in Butte.

I do not find a staining of the surface of the bed-rock in shaft No. 21, that Mr. Winchell spoke about. I find the staining in the hundred and ten foot shaft, No. 21, iron, the same as I find in tunnel No. 30, immediately east of shaft 21. In shaft 21 there are seams visible. As to there being any seams or breaks or planes, in the country rock in tunnel No. 30,—there is walls there, between this soft, sugary vein matter, which I spoke of, on the south side of the tunnel, and this coarse blocky granite on the north side of the tunnel,—it is visible there. Any man can go there and see to-day. I brought a sample of this sugary material that I call vein matter in tunnel No. 30. This sample that I now produce I obtained from this south cross-cut of tunnel No. 30. I call the principal part of the material of that sample vein quartz. The crystals are plain to be seen in the quartz there. It can be seen in any of those pieces, also in this, shows the quartz there distinct. Here is the quartz visible, the crystal. From an examination of it with the eye it has no mineralization excepting iron. It has the indications of iron, which is readily judged by its coloring. As to this being material that you would encounter near the surface

(Testimony of Louis Mason.)

in veins in Butte—it is just as good a material as I see on what is known as the Butte Hill, where the various railroad cuts in their excavations have cut the largest veins on the Butte Hill, which the extensive mines are mining to-day.

(Sample offered and received in evidence and marked Defendants' Exhibit No. 97.)

[698] Where I obtained this material in this south cross-cut the material was in place there at the time I obtained it. About two feet and a half north from the south end of the south cross-cut, there is true wall running east and west, and this sample was taken from out of the breast and in front of this wall running east and west. As to the evidence that this lead had any strike,—there is three distinct points in this tunnel that indicate clearly the easterly and westerly strike. As to its dip,—the first two walls that show in the tunnel are inclined to the north. This short wall that runs across the south cross-cut, at about two feet or two and a half north from the south end of the south cross-cut, there is the least incline toward the south. Of course, it only showed a distance vertically of about eighteen inches, that would be a small space to judge on.

I have here a sample that I obtained from shaft No. 2; I obtained it from the eastern portion, probably two feet from the bottom, up. It was in solid material there, in place. I would call that vein quartz. There are quartz crystals visible.

(Sample offered and received in evidence, and

(Testimony of Louis Mason.)

marked Defendants' Exhibit No. 98.)

Tunnel 31 was run by myself and several others, at different times, representing the claim. The last work I did on that tunnel was in 1910. The character of the work that I did then was drifting and cross-cut to the north from the tunnel. From where you pass underground at the present time, to where you encounter bedrock, I should judge would be a distance of about twenty-five feet, something like that. I have not measured that. I cannot say, accurately. I have never measured the length of the tunnel with a tape, but I should judge it to be about a hundred and twenty-five feet. The depth of the bedrock, [699] from the back of the tunnel to the surface of the bedrock, would vary as the tunnel extends eastward,—it would gradually keep getting deeper beneath the surface of the bedrock. It would be difficult for me to say how deep we are in bedrock at the face of the tunnel, because I did not know from a survey or taking from a level, how far it is from the bottom of the tunnel vertically to the surface. The whole face of the tunnel vertically is in bedrock. You pass in the tunnel to a distance of about thirty or thirty-two feet, I would judge, there is a cross-cut extends to the north the length of about thirty feet approximately, and very near opposite this northern cross-cut, is another cross-cut driven in a southeasterly direction, a distance of about twenty-five feet, and then as you go on in the tunnel, to about a hundred feet, or a hundred and five feet easterly from the entrance of the tunnel,

(Testimony of Louis Mason.)

there is another cross-cut extends south a distance of about twelve, fourteen feet, and also a small cut on the north side, opposite of the cross-cut, extends south, and the north cross-cut extends out about two feet and exposes the hanging-wall there.

As to a lead encountered in this tunnel, or in any of the workings from it,—I think I have given testimony on this point, that the first cross-cut leading to the north, I think you will find that I stated that that cross-cut starts out in oxidized vein matter, similar to what I emptied on that paper a while ago, and as it proceeds northerly, there is a space of probably ten or twelve feet that has some vein granite, mixed with the other vein matter, and then you come to a harder formation *whether* the copper shows more prevalent, and at a distance of about twenty feet north from the tunnel is a strata of copper ore, running easterly and westerly, with a slight dip [700] to the north, and I should judge that that would run about fifteen per cent copper. Since I testified before, that tunnel or that cross-cut has been extended farther north a distance of probably nine or ten feet beyond this streak of rich ore which I have just spoken of. And the material north of this first rich streak is all vein matter, showing copper promiscuously through it, till you approach near the breast. There is a body of copper ore at least two feet and a half in thickness, running up on the west side of the cross-cut, and on the east side of the cross-cut, passing over in the back and across the bottom of it, I consider a high grade of copper ore, and the face

(Testimony of Louis Mason.)

of the cross-cut shows principally granite.

After you come back out of the north cross-cut, into the tunnel, you go in a northeasterly direction, a distance of about twenty-three or four feet, I think, there you come in contact with this same character of copper ore. I have a sample here that I got of the first ore of note, shown as you go east from the north cross-cut. That is in the tunnel. This sample is a large piece, but I did not desire to bring it, but I had to compete, or to show Mr. Winchell that there was some quartz there. Where I obtained this sample would be about twenty-two or three feet, I think, in a northeasterly direction, from where you start out from the tunnel, in the north cross-cut. I call the material in this sample quartz, bearing copper. The quartz crystals are readily visible there on various points.

(Sample offered and received in evidence, and marked Defendants' Exhibit 99.)

As to the width of the vein as it appears in that tunnel and in the cross-cut,—I am of the impression, or I think that the footwall side of the vein, as shown, where the north cross-cut starts from the tunnel, and apparently the breast of the [701] north cross-cut, is passing out of the vein, as it appears to be granite, none mineralized. I should judge the width of the vein there about thirty-two or three feet. I did not measure it by steeping—I estimated it to be about twenty-two or three feet. The first cross-cut to the south is in the footwall country rock. It shows no stain of copper that I could find. I made

(Testimony of Louis Mason.)

an examination of that cross-cut for the purpose of seeing if I could find the copper stain there, and I did not. The cross-cut near the breast of the tunnel, running to the south, is about twelve feet, or fourteen, something like that, in length. It shows copper through the formation in its entire length, and in the breast, and it is a question in my mind whether we have reached the footwall there yet or not. The hanging-wall is plainly to be seen on the north side of the tunnel, opposite the south cross-cut.

As to opening 15, I think I sunk that in representing at different times. I could not say exactly who sunk No. 5. That was done,—I have not the date now,—but I can give reference when Clint Clark and others were operating the Pacific mine, east of this ground in controversy, in the winter, in the December month, I think it was,—we had men employed that sunk No. 5, No. 6 and, I think, No. 3, as it is represented there, in representing that year. There was two of them that was in bedrock,—three and five; 3 and 5 showed copper stain and iron stain at bedrock,—oxidized material; 6, I do not think that shows bedrock. I think the dump to-day will show there that there is no rock there. No. 8, as I testified before, I sank in 1891, down to a depth of about eight or ten feet, and I discovered that I was off on the Birtha ground and I abandoned it then; and No. 4 as on this map, and No. 12, and No. 14, shown on this map, are on the Birtha ground, and were sunk by [702] Mr. Dean and Mr. Jones through a lease that they had, and they shipped ore from them.

(Testimony of Louis Mason.)

I think I am confident that shaft 21 and those shafts and tunnels easterly, are on the same vein, some of them are near the hanging-wall and some are nearer the footwalls, the vein being a large—

Shaft No. 19 was sunk in the latter part of the summer of 1911, last Summer. As to how I came to sink a shaft at that place,—I judged by the various shafts and tunnels farther east that the strike of the vein in its southwesterly strike, by sinking where I did I should come in contact with the vein. That is the lead that was disclosed in the Rabbit discovery.

Q. There is something in the testimony which you gave us here before, that puts you in the position of stating that the lead that was disclosed in the Hornet discovery shaft is the lead that was disclosed in the Pleasant View discovery. Is that correct or is it incorrect?

A. I read the testimony. I did not see that when I read it. You called my attention to it, and I must say I find the answer that way, but it is not right. I certainly made a mistake when I answered it that way, because if I had understood the question right, I certainly would not have answered the question that way.

In shaft No. 19 I find a lead. That shaft is about eighty-seven feet deep. It is about eighty feet in fill and approximately seven feet or seven and a half, somewheres, there, in bedrock. The bottom or the shaft is entirely in lead matter, blue talc and white talc and quartz, considerably iron stained. I have a sack of quartz material, taken out of that shaft,

(Testimony of Louis Mason.)

here. I obtained this sample within the bounds and limits of the shaft. That piece shows copper distinctly. I call that vein [703] material, composed principally of quartz,—possibly some porphyry. This material at the time I obtained it was in place. I dug it up out of the shaft, and hoisted it to the surface and brought it to the court. The entire shaft is within the vein, with streaks of quartz through the vein matter, as you usually find in the vein. Those streaks show an east and westerly strike. The streaks and also the lines in the talc indicate a south dip. Since I sunk the shaft, the last set of timbers was not all lagged, and it is caved in from the east end and the west end, and the south side,—and as it has caved off from the south side, it shows the granite boundary on the south, which I would judge to be the hanging-wall. I would judge the vein to be north from the south side of the shaft, extending north.

(Sample offered and received in evidence, and marked Defendants' Exhibit No. 100.)

It is the most westerly opening on the Hornet vein, within the bounds of the ground in controversy. This shaft would be about seven hundred and fifty feet easterly from the west end line of the Hornet location; and approximately the same distance easterly of the east end line of the Gulf location; and about three hundred and twenty feet easterly of the west end line of the Hope location. It would be about one hundred feet north of the side line of the Hope, and it would be about seventy feet north of the side

(Testimony of Louis Mason.)

line of the Gulf lode. If I understand that Hornet line right, it would be south of the south side line of the Hornet; but I will say that it is about seventy feet north of the north side line of the Bullwhacker,—that covers the southerly limits of the ground in controversy.

I ran the tunnel to the east of there with the assistance of other help. It was run in the fore part of last summer, 1911,— [704] that is tunnel 35. The tunnel is approximately 125 feet in length. Bedrock begins about ten feet west from the face of the tunnel. The south wall of that tunnel is in granite; there is a short cross-cut then, within five feet of the breast of the tunnel, running to the north; and at the face of the north cross-cut is a true wall, running in an easterly and westerly direction, dipping to the south. From the south side of the tunnel, north to the cross-cut the formation is of a quartzzy nature, or quartz porphyry, and I should say vein matter. The breast of the north cross-cut, there is a true wall, as I stated a minute ago, running in an easterly and westerly direction, and rises about two feet and a half high, with a south dip. I could not say whether this material carries any mineralization or not without assaying, excepting it shows the iron plainly. I do not find the green copper in that tunnel. I found in the float where I reached bedrock, but not in bedrock, I do not find it.

After that I went into tunnel No. 36. That tunnel was run by myself and Mr. Clark and Mr. Dean and other parties that has worked in it different times

(Testimony of Louis Mason.)

in different years, representing. Taking its easterly course, I should judge the length of the tunnel to be about a hundred and forty feet, possibly fifty. Where you pass under the ground, it is possibly thirty-five feet to where bedrock shows in the bottom of the tunnel. There is three cross-cuts from this tunnel, one extends in a southeasterly direction and two in a northerly direction. The cross-cut that runs in the southeasterly direction goes into bedrock; it is entirely in granite. I do not find any green copper stains in that. There is an occasional strata of quartz, probably an inch thick, across it—is the only visible formation, outside of granite. Running north from where the southeast [705] cross-cut leaves the tunnel, there is a cross-cut runs about sixteen feet to the north and about two feet or so after you turn north from the tunnel, you encounter the vein, and the vein there, I should judge to be about ten feet in width, from foot to hanging-wall. The material that you encounter in the vein there is of a brown, iron-stained quartz and porphyry. You can tell that it carries no mineral, by looking at it, excepting iron.

I spoke of encountering a lead or a vein in the north cross-cut from tunnel No. 36. That is not the only place in the workings in that tunnel where you encounter this vein. Running easterly from this north cross-cut, a distance of about forty feet, I should judge, on the vein, then we turn and drove a cross-cut directly north again, a distance of about eighteen feet. We cross-cutted through the lead, ap-

(Testimony of Louis Mason.)

parently, there. We came in the granite formation, and there was a wall running in on an easterly and westerly course,—this northerly cross-cut. As to what the width of the lead was that was disclosed in that tunnel 36 and the workings,—the first cross-cut leading to the north cross-cuts the vein, I should judge it to be somewhere nine or ten feet across there, then we drift easterly on the vein a distance of about forty feet; then we cross-cutted north from that point a distance of about eighteen feet, and apparently there we found the footwall of the vein again, and I should judge the vein there to be seventeen or eighteen feet wide at that point. Its dip as compared with its dip at other points where I noticed it,—was in a southerly direction. I have not a sample of that; I will produce one to-morrow. The tunnel extends about twelve feet farther east from the last cross-cut that runs north. It extends along the hanging-wall, and there is two or three places there that I [706] saw a small amount of green stain,—is the only place I saw staining in that tunnel, of copper.

I did not run tunnel No. 37, nor no other parties working under me. It was run by Mr. Samuel Kift and Mr. Isaac Knoyle, to the best of my knowledge. I made an examination of the workings there. The tunnel runs in the hill in an easterly direction, and a little south on an east and west line, of the Hornet shaft and there is a cross-cut leads off to the north from the tunnel, and intercepts with the shaft situated under the entrance of the Mullins tunnel, and

(Testimony of Louis Mason.)

between tunnel 37 and the Mullins tunnel, there is a vein, and I have a sample of copper ore from that vein matter. This is the material that I got from that tunnel. I dug out of the east side of a cross-cut leading from tunnel 37 to a shaft under the Mullins tunnel. The material where I got it appears below bedrock and in a body or strata, running in an easterly and westerly direction.

(Sample offered and received in evidence, and marked Defendants' Exhibit No. 101.)

I obtained this material from the streak I spoke of. The streak is about a foot wide. Mr. Gage was with me at the time I took it. The material on either side of the streak is vein material. The south side of tunnel 37 shows granite, the north side of the shaft, situated under the entrance of the Mullins tunnel, shows granite, but the walls are not bounded with talc there; it is so near the surface that they are harder to distinguish than they are deeper down. To the best of my knowledge, as I can see, these granite boundaries constitute the walls of this vein that is disclosed there. I did not measure it, but I should judge the lead was about thirty-five or thirty-eight feet wide. I stated that this material was encountered in the cross-cut running from the tunnel to the north. [707] The northern portion of the cross-cut connects with the shaft that is immediately under the Mullins tunnel. I took a sample out of what Mr. Winchell said was the lead in the Hornet tunnel or Mullins tunnel. I took a sample from out of the hanging-wall, as Mr. Winchell testified, in the stope

(Testimony of Louis Mason.)

below the Hornet tunnel, and I have a sample of sulphide ore from the dump made in excavating or sinking of the Mullins shaft,—inclined shaft. I took the sample out of the lead and the sample from the wall, the hanging-wall as it was testified to, to show that the hanging-wall, as it was represented by Mr. Winchell, is not, in my opinion, the hanging-wall of that vein; that the two samples are almost identically the same. This is the sample I obtained from the lead, as designated by Mr. Winchell.

(Sample offered and received in evidence and marked Defendants' Exhibit No. 102.)

I should judge this was taken about six or eight feet west from the eastern end of the tunnel. This that I now produce was obtained from the hanging-wall, so designated by Mr. Winchell as the hanging-wall.

(Sample offered and received in evidence and marked Defendants' Exhibit No. 103.)

I do not see any difference in those two samples, and I think that an assay would show that both samples would carry very near the same percentage in copper. Sample No. 103 was obtained in the stope below the Mullins tunnel. I picked it off of the hanging-wall, or out of the hanging-wall, in three different places. One place from near the west end of the stope, one place near the middle of the stope, and the other place from close to the east end of the stope; all three places the ore was taken out of the hanging-wall. I did not make a break in the hanging-wall of any depth for the purpose [708] of

(Testimony of Louis Mason.)

getting the sample,—appeared to be three inches or so,—drove a pick in sufficient to pry out the ore.

I took a sample of sulphide ores from the dump that was made when Mr. Mullins, and I think, Mr. Kemper, sunk the inclined shaft to a depth of about a hundred and eighty or ninety feet. As to my knowing whether it came from the shaft or not,—I saw the dump being made daily, as it was made, and the rock was hoisted up and dumped. I saw them going there regularly. As to my object in bringing that sample here,—I have to refer to Mr. Winchell again. Mr. Winchell stated that there was no sulphide ores mined in that vicinity, within a mile west of the ground in controversy, so I procured the sample from this dump, and also one from the Maggie mine, seven hundred feet south of this ground, and another from the Blake mine, about two thousand feet east, near Columbia Gardens. I took the sample from the Maggie out of the ore bin. I took the sample from the Blake mine from the dump where it was piled up, when it was hoisted out of the shaft. This sample is the one I obtained from the Mullins inclined shaft. I call that copper ore, commercial copper ore,—sulphide ore.

(Sample offered and received in evidence, and marked Defendants' Exhibit No. 104.)

This is the sample I obtained from the Maggie. It is sulphide copper ore. I should judge it would be commercial, although I have not assayed it, and I cannot say what per cent of copper it carries.

(Sample offered and received in evidence, and

(Testimony of Louis Mason.)

marked Defendants' Exhibit No. 105.)

This is the sample I obtained from the Blake. It is sulphide copper ore.

(Sample offered and received in evidence, and marked Defendants' Exhibit No. 106.)

[709] This Blake property I should judge to be about two thousand feet in an easterly direction, and a little south from the ground in controversy. In speaking of the ground in controversy, I mean from the southeastern portion of the Butte and Boston placer and the Hornet and Hope lode claims. The Maggie quartz lode claim is situated about six hundred and fifty feet south from the south side of the ground in controversy, and about fifty feet south of the south side line of the Bullwhacker lode. The Maggie mine is not in operation now. It has been suspended two years, about. The operations were suspended on account of Mr. Hopkins not being able to carry on his work for some reason. It was about seven years ago that operations were suspended in the Blake. It is a small fraction, probably two acres. The Maggie is about ninety feet deep.

This sample was taken from the Vesuvius fraction, from out of the joint, or adjoining joint, situated south of the shaft, about eighteen feet, and running in an easterly and westerly direction. This sample came out of a vein, and there is also a vein crossing the north cross-cut of the Vesuvius shaft, about thirty-five feet north of the Vesuvius shaft. In my judgment these veins are separate and independent of one another. The strike of the lead from

(Testimony of Louis Mason.)

which I obtained this sample is east and west. I could not say exactly what the variations are. The vein from which the sample was taken here, is very near vertical. It has a slight inclination to the north.

(Sample offered and received in evidence, and marked Defendants' Exhibit No. 107.)

I never heard the phrase master joint used in mining. Here is the first time that I ever heard that phrase used relative to mines. There are cleavages or planes in granite, but I have not found them to be of any extent in this vicinity.

[710] This lead in the Vesuvius does not resemble any joint or crack in the granite, like you find in the country rock. I should judge the width of the vein was from eight inches to a foot, where I obtained this material. It was not of uniform width all the way through; there is one place about the center of the distance that I had it open from east to west, that narrowed down probably to eight inches or less. The rock adjacent to this lead is stained, or impregnated, or carries copper, south for a distance of four or five feet, then the coloring diminishes, and in the breast of the cross-cut, it shows but very slight,—a white granite composing part of the breast of the cross-cut itself. The north side of this vein, there was a cleavage or a slip, I should say a wall, but on the north side for a distance of four or five feet, it is mineralized, and the stratas of quartz an inch or an inch and a half thick running east and west, that is highly impregnated, or that carries quite a good deal of copper. I should judge where the cross-cut extends south

(Testimony of Louis Mason.)

from this east and west vein, that at that point the vein possibly is two or three feet in width, but the south side is not bound by a tale wall.

As to the leads existing in the different openings on the ground in controversy, extending from the Hornet shaft westerly to shaft No. 19,—the strike of the vein and the lead matter in the various openings seemed to be the same,—very near,—and all apparently in a very nearly easterly and westerly line with each other, and I should judge that they are all on the same vein and would continue to consider it that way without development extensively should prove I was wrong, which I do not think that it will.

[Testimony of William R. Hocking, for Defendants (Recalled).]

[711] WILLIAM R. HOCKING, heretofore duly called and sworn as a witness on behalf of the defendants, being recalled, testified as follows:

Direct Examination.

(By General NOLAN.)

The WITNESS.—Defendants' Exhibit 89 is a return made by me from samples turned over to me by Mr. Barker, and correctly represents the values of the samples so turned over to me as to silver and copper.

By General NOLAN.—We desire to offer in evidence Defendants' Exhibit No. 89.

Cross-examination.

(By Judge BOURQUIN.)

The WITNESS.—These samples were some green-

(Testimony of William R. Hocking.)

stained rock he brought in there, a couple of five or six pound samples, in ordinary sample sacks; they were both of them of green stained rock; they were probably the size of an inkwell down to finer stuff.

By the EXAMINER.—That will be received in evidence.

(Signed by witness before the examiner, February 17, 1912.)

[Testimony of Andrew G. Ray, for Defendants.]

[712] ANDREW G. RAY, duly called and sworn as a witness on behalf of the defendants, testified as follows:

Direct Examination.

(By General NOLAN.)

The WITNESS.—My name is Andrew G. Ray; I live at Butte; am engaged in mining, and am in the employ of the East Butte Copper Company, and before being in the employ of that company was in the employ of the Pittsburg and Montana Company; when I started with that company I was employed as a miner, and thereafter promoted to position of foreman. The Pittsburg and Montana Company owns and operates the property west of the ground that is in controversy here. I am now mine foreman for the East Butte Company and have charge of what properties they have. I know of a lead running through the Pittsburg and Montana ground, west of the ground in controversy here, known as the Donner lead, and in my position as foreman have something to do with the operations carried on in that lead; we have opened the Donner lead in our property about

(Testimony of Andrew G. Ray.)

three thousand feet; its course is east and west; it waves a little, but taking it throughout its entire distance of three thousand feet, it does not deviate from the east and west strike in any direction; it might deviate twenty or thirty feet,—such a matter as that, to the north, at the west end; that lead dips to the north; it seems to be a good deal flatter at the west end,—that is, it pitches more. On its easterly strike it is worked on the twelve hundred; it is within about four hundred or four hundred and fifty feet of the line; on the ten hundred we didn't work it, just cross-cutted through it; and on the [713] eight hundred it is within about seven hundred and fifty feet, I should judge, from the line. The dip at the easterly end of it is considerably steeper,—that is, it don't pitch quite so much in the west end as it does in the east end. In places it seems to fall over and then straighten up and then fall over again and then straighten up, but the general strike or dip from the twelve hundred to the eight hundred shows to be steeper on the eastern end than it is on the western end. I do not recollect any observations having been made in my presence, with instruments, for the purpose of determining the angle of the dip. From observations I have made, I should judge the angle of the dip to be about sixty-five degrees. I would not be sure, but that is my judgment. I never used an instrument for the purpose of determining. Taking this lead throughout its entire distance of three thousand feet, it is a good strong ledge, in some places wider than in others; I should judge though, it would

(Testimony of Andrew G. Ray.)

average close to four or five feet, all the way through, and a good deal of this lead, in the workings that have been carried on, furnishes commercial ore,—not all of it. There is no evidence that this lead, in its easterly strike and where it is last known to me, is petering out; there is no indication of it petering out. The lead does not go very far away from its regular strike at any point; it is very near straight; there is only one place that it has been shifted, to my knowledge, by faults; that is at the intersection of another vein. This other vein I refer to is known as the Motheral, and that I believe has a strike of northeast and southwest; I should judge it is about fifteen hundred feet west of the easterly end of this lead as it is known to me that the [714] Motheral intercepts the Donner; the Motheral comes along and intercepts the Donner about fifteen hundred feet east of the westerly end of the Donner. There is about thirty feet of a displacement occurring at the point of interception, I should think,—that is, from where the Donner is at one side of the Motheral, to where it is picked up on the other side,—that is, it is spread apart; and where the displacement occurs, the Donner is thrown to the north as you go west; the Motheral vein dips north where it intercepts the Donner. I have not been on the ground in controversy to make any examination of it, and I could not say that I have been on it to notice anything; I have not been in those workings for two or three years, and then just happened along there and did not pay any attention to them. If this Donner lead prosecuted its course

(Testimony of Andrew G. Ray.)

easterly and beyond the ground owned by my company it would go into this ground in controversy. I could not say whether my attention was called to the northwestern corner of the Butte and Boston placer as it is shown on the map here. I know where our line and shaft is; I don't know where the northerly line of the ground in controversy is. The ground of my company, at its northeasterly point runs westerly a distance of six hundred feet and then runs to the north,—I know that. Assuming that the northerly point of your ground is where the easterly portion of our ground runs to the west, and then to the north, I should judge that this Donner lead, if projected easterly would run into your ground about between two and three hundred feet from the corner,—north-westerly corner; I would not say accurately, but I have seen our maps there, and I should judge from the strike of the vein it would cross that ground. [715] I have never been in there to know whether there are any leads there whose strike is east and west; that work is closed up and used as a tank. I made no examination of the ground to tell whether there was any northerly lead, running through the ground in controversy. I could not say anything in regard to a lead on the ground in controversy. I not been on the ground recently. I do not know whether such a lead as the Donner lead, with its size and persistency in its course, is or is not likely to terminate where it is last visible in its easterly strike; it did not terminate where we quit; it is still existing. I do not think that it ends within five feet from that

(Testimony of Andrew G. Ray.)

point where we last quit it, because it has been so persistent; we have followed it clear the whole length of the property, clear to the Silver Bow,—that is, not exactly, of course, the whole length of it, but it is three thousand feet and within four hundred and twenty feet of the east end line and clear to the west end line, and there is nothing in the ground condition, where I last saw toward the east, that would suggest to me, in the light of my experience, that this lead ends there.

Cross-examination.

(By Mr. SHELTON.)

The WITNESS.—I first started as a miner in 1892; before going to the Pittsmont I worked in some other mines here in Butte—in the Mountain Con and the Anaconda, and over in British Columbia and over in Meagher County. With the Donner vein there is one displacement by the intersection of the [716] other ledge. There is a fault runs from north to south. I should judge it is about two thousand feet from the eastern opening of the ledge, possibly; it shows to be a jumbled up mass from about forty to sixty feet thick, pitching eastward; we traced it to the eastern side of it, and then worked through and picked it up on the western side of it, and then went on. The part of the Donner vein which I found west of the fault was not displaced at all; the ground was just rumpled up, but its course was about the same; there is no material difference. That is the only fault in the Donner vein that I know of. We have not worked the Donner vein on the west end of

(Testimony of Andrew G. Ray.)

our property below the twelve hundred foot level on the west end; a portion of the ore has been stoped out down to the twelve hundred on the west portion of our property; on the west end of our property the ore would differ from a foot and a half to six or eight feet; the western end of the vein, I should judge, would be somewhere about six feet—six, seven feet. It bulges out and gets big fast after. We have a winze sunk on it on the east end and we mined ore on it within six hundred feet of this ground in controversy, and the width there is about five or six feet. I was never engaged in the same capacity as I am now, to determine whether veins I worked in before came to an end some place. Of course, I noticed that ledges come to an end, in fact silver ledges, chiefly. Those copper ledges are pretty persistent. I cannot look ahead into the ground and see when it is coming to an end, or when there will be abrupt endings of a vein. I only know on different levels whether a vein will continue for five feet or a hundred feet—when we have had the experience with them on a different [717] level, where we would run up against a fault and displacement, and when driving on another level, we would naturally expect this same break or fault—or whatever it might be—would terminate the ore or ledge at that time, until we would find out beyond. That is all we can do as to looking ahead. We used to run up against such problems over there where the continuity of the vein has been broken by a fault, and where they have been unable to find the continuation of the ledge, but with experience, we have been

(Testimony of Andrew G. Ray.)

able to kind of reason those faults and displacements and we are able to go after them, after this fault or breaking, and pick them up again—I mean over there in the Pittsmont ground; by my experience over there I have learned about the ground so I am better able to find the ledges that are broken. I cannot say that outside of the Pittsmont ground I have known of instances where the veins have been broken by faults and the miner has been unable to find the continuation of the vein, owing to the fact, as I said before, that I have not been in this capacity, to know the reason why drifts were stopped, or anything pertaining to them; and, of course, I cannot look ahead into the ground and tell where the fault will be encountered. In the dislocation of the Donner vein by the Motheral vein there was what the geologists call a compound fracture there, and the dislocation of the Donner vein, from its east and west course, I should judge from where it is separated, the ends of them swung around, or not exactly swung around but kind of mixed up, so that they might be about thirty feet apart. As you go to the west on that vein you find the continuation of the vein north of the east part, and the throw is to the north as you go east in [718] that particular instance—the only one in the mine; that is at the dislocation of that vein and the Donner, and that is the only place where I noticed, which is to the north. The other dislocations are to the south as you go east. We have numerous faults—that is, displacements, on the ledges, and we follow along and come right up against a straight

(Testimony of Andrew G. Ray.)

wall—nothing, not a single thing in the face—but our experience is—well, it will turn to the left, no matter which way we are going, and pick up the ledge again, and it is reached in the same form as ever again. That would be turning to the north going east. I said the Donner was going to the north, going east; that is the only one that is thrown that way; the Donner is thrown to the south going east—thrown to the north going west. These other dislocations are simply displacements, or movements, in the ground—I don't know what you would call them—where the ledge seems to be shifted, and it is always a ledge running east and west. If you are driving east and lose it, we go to the left; if we are driving west on it and lose we go to the left. I am not speaking now of the Donner—this Motheral and others. These other ledges we are working run parallel with the Motheral, north and south of it, some places they are eight and ten feet wide—three and four feet—six, eight, and they have a strike the same as the Motheral, and dip to the north; I have worked those ledges from the ten hundred; they do not head toward this ground in controversy—they strike north of it. I believe we have mined over in one of these ledges to within two hundred or three hundred feet toward the eastern side of our property; this one I have reference to is north of the Motheral ledge, and the Donner is south of it. I believe [719] I am a little off on that proposition; there ain't any south that I can recall just now—that is, that we have worked. We have run across little ledges we have

(Testimony of Andrew G. Ray.)

never tried to open; there were so many of them we can't open them all; they all dip to the north. The eastern portion of our ground is as yet comparatively unexplored. The ledges I refer to now is in the new drift driven in the ten hundred from the No. 2 shaft westward. We have crossed several small ledges that would be south of the Donner and also south of the Motheral; this drift is altogether south of the Donner. There is not any exploration work between the Motheral and the Donner, in the eastern portion of our property, on any ledges; just crossed them; the drifts go through them, and we notice them that way; but there are ledges there, but I could not tell you about them—only just driving a drift through—across them, with a drift. The opening I made would not be in the direction of the lead; you could not call it a cross-cut or a drift—it would be a cross-cut I suppose. I should judge the dip of the Donner was about sixty-five degrees to the north. The Donner vein is about three hundred feet from our north line, I should judge—to the vein at the twelve hundred foot level, and it is about four hundred feet from the end line, or four hundred and fifty. We have to work that ledge a hundred and forty feet over the eight hundred, and about seven hundred feet from that end line. We only work it up to the oxidized zone. If we projected that line up to the surface of the ground, the apex of the vein on this projected line would naturally be somewhere south of the vein as it is shown on the twelve hundred foot level, because the vein dips to the north. I could not tell you how

(Testimony of Andrew G. Ray.)

far south that would bring it. On this map, on the eight hundred [720] or on the twelve hundred, it shows to be two hundred and fifty feet, probably apart, and that would bring it two hundred and fifty feet further to the south at the apex. As you proceed easterly in the vein, and barring any dislocations by faults, judging from the distances we have opened it and the strike of it, I would expect it to maintain this same general strike.

Q. Do you know anything about the general strike of other veins in the district? Do you know of any other veins that maintain a uniform strike—that is, without any great deviation, for a distance, and then depart very materially from that strike?

By General NOLAN.—Object to that as not cross-examination.

A. Well, no, sir, I do not.

The WITNESS.—I am not very familiar with the other veins of the district regarding the strike, only our own property. The strike of the vein at the eastern extremity of the portion that is opened does not differ considerably from the general strike of the vein through the balance of its course; it seems to be in the same direction; I do not think it is about north seventy east—according to the map.

Redirect Examination.

(By General NOLAN.)

The WITNESS.—The highest stoping or level is the eight hundred level, and the lowest level at that point is the thirteen fifty; we have timbered from the thirteen fifty to the eight hundred—from the ten hun-

(Testimony of Andrew G. Ray.)

dred to the eight hundred at that point has not been worked; the ledge is intact; it has not been mined out, but from the eight up and from the thirteen [721] fifty to the ten hundred has been worked; from the eight up, we have stoped the ore for a distance of one hundred and forty feet. That would be the pitch of that vein. I do not believe it is over eight feet it would pitch in that hundred and forty feet; it is awful near straight up. There are not any developed leads between the Motheral and the Donner in the eastern portion of the ground; in the development work done there by me, in running cross-cuts I have encountered little leads, but we have not developed them at all, and their strike is northeasterly and southwesterly—the strike is like the strike of the Motheral lead, and having in mind the location of this ground in controversy here, these leads with that strike, would naturally be north of the Donner at that ground—as to how far, I could not say; and those leads that I encountered in that cross-cut, if they pursue their course, would intercept the Donner lead in its course easterly and westerly, and in crossing the Donner lead, if they persisted in their course sufficiently so as to encounter the Donner lead, they would cross it at an acute angle.

Recross-examination.

(By Mr. SHELTON.)

The WITNESS.—This cross-cut that I speak of that cuts these is on the ten hundred level, and I should judge they had about the same dip as the Motheral; the Motheral is not of a flatter dip than

(Testimony of Andrew G. Ray.)

the Donner; the Motheral at the eight, ten and twelve—they are nearly one over the other. We were driving this cross-cut for the purpose of encountering the Motheral veins, and they seemed to have the same strike as the Motheral—just about—that is, the drift is run perfectly straight, and they [722] cross it at about the same angle as the Motheral vein, so I should think they would be the same. These veins are quite a little ways south of the Donner and the most northerly one that I encountered would be five hundred feet south of the Donner, running in a northwesterly and southeasterly direction; that is, at the point where we intersected them—we were that far on a straight line south of the Donner; that vein followed on its strike would come a good deal closer to the ground in controversy than the Motheral would, but, of course, they would not go without intersecting the Donner, the chances are, before they would go to this ground in controversy; and when they would intersect the Donner, they would be probably a fault or dislocation, and we would pick up the vein beyond the dislocation, and pick up the vein very probably in the ground in controversy; they would either intersect the Donner or be intersected by the Donner. When I spoke about the pitch of the Donner departing about eight feet in a hundred and forty, I was speaking of the pitch of the lead at the eastern end of the Donner, at the eight hundred; it seemed to straighten up there considerably more than it had in other places. The dip is more nearly vertical for a dis-

(Testimony of Andrew G. Ray.)

tance, and then at other places it would flatten, and this place I was talking about was a place where the dip was more nearly vertical.

Redirect Examination.

(By General NOLAN.)

The WITNESS.—That vertical condition of the dip is observable in the eastern portion of the lead.

[723] Recross-examination.

(By Mr. SHELTON.)

The WITNESS.—I did not mean to say that all of the vein as explored at the eastern portion of the ground had that extreme vertical dip.

Redirect Examination.

(By General NOLAN.)

The WITNESS.—We have not opened this vertical dip any further on the eight hundred. I have explored the lead some distance easterly of the point I am referring to where I fixed the dip at eight feet in a hundred and forty; that would be about a hundred and fifty or possibly two hundred feet westerly of the most easterly point of the lead as it is known to me. I will take that all back. I was thinking about where we had worked it down below. We drifted on it then four hundred and fifty or four hundred—I would not be sure—and this place where we stoped it, that is seven hundred and fifty feet east of the end line—west of the end line, I mean; we have not exploited the lead east of that point on that level.

(Signed before Examiner February 3, 1912.)

**[Testimony of Samuel Barker, for Defendants
(Recalled).]**

[724] SAMUEL BARKER, heretofore duly called and sworn as a witness on behalf of the defendants, being recalled, testified as follows:

Direct Examination.

(By General NOLAN.)

The WITNESS.—When I was on the stand before I told you that I had access to the maps, the working maps, of the Pittsmont—the East Butte Company—as to the workings on the ground west of the ground in controversy. I was shown two working maps, purporting to show the underground workings in reference to the surface lines. Having in mind the location of the Donner lead as shown in those workings, and its location with reference to the ground in controversy, if it continues in its strike easterly, I should say it would have to enter this ground if it continued easterly from where it is now shown and worked in the Pittsmont ground. That is the red marking on the west boundary of the Butte and Boston placer.

Q. I wish you would project a line upon this map of ours, Defendants' Exhibit 1, from shaft No. 21 to this red marking upon the map.

A. That is the red marking on the west boundary of the Butte and Boston Placer?

Q. Yes, sir, run a line.

A. (Witness draws a line on map.)

Q. And for the accommodation of the other side,

(Testimony of Samuel Barker.)

I wish you would likewise run a line from that point to this pencil mark "C-1."

A. (Witness draws line on map.)

Q. And, of course, this map being drawn to a scale now, I suppose by the application of a ruler, we could tell the distance northerly or southerly from that new line thus projected to the side lines of those mining claims shown upon the map? A. Yes, sir.

Q. That is, the map itself, by the application of a rule fixing distances, would furnish the data by which the course of this line could be marked upon the ground?

A. Yes, the line—or any line—can be marked on the ground [725] and in reference to any other line that is shown on this map.

Q. Now, I wish you would likewise use your ruler, so named, and having in mind the strike represented by those openings from the Hornet Discovery to shaft No. 19, and project a line westerly, approximately, with the strike existing east of the shaft No. 19, to the western extremity of the—

A. You want the line extended from 19—

Q. On westerly.

A. (Witness draws line.)

By Judge BOURQUIN.—I think those lines ought to be identified by letters.

Q. You might also run a line through shaft No. 21 easterly, so as to encounter the system of veins about which you testified when upon the stand.

A. (Witness draws line.)

Q. Now, then, so that we might be able to identify

(Testimony of Samuel Barker.)

those lines, and especially the line commencing at this shaft No. 21, will you put a mark there?

A. (Witness marks on map.)

By Judge BOURQUIN.—The first line projected, he marks “X.”

By General NOLAN.—21.

A. The first line I marked on the west end by “X,” therefore the line first put on this map would be denoted by X-21, meaning shaft 21.

Q. And then the line east of shaft 21 will be designated how?

A. It would be noted by 21-Y.

By Judge BOURQUIN.—That was the third line projected.

A. That is the third line projected.

By Judge BOURQUIN.—No, that is true, the record will show.

Q. The other line would be denominated how?

A. That is the line you asked to be put on for the plaintiff in the case?

Q. Yes.

A. That line is designated as Z-21-Y. The first line is now designated as X-21-Y.

[726] Q. Now, as to the line marking the strike of the southerly lead, how do you designate that?

A. I have designated that at the west end by the letter “F,” on the east end by the letter “T.” Therefore, the line would be F-T.

By Judge BOURQUIN.—All on what exhibit?

A. All on Defendants’ Exhibit No. 1.

Q. And you might also likewise project a line from

(Testimony of Samuel Barker.)

21, observing the same strike that is shown east of shaft 21, to the westerly extremity of the ground.

A. (Witness draws line on map.)

Q. And you can mark that by some markings by which it can be identified.

A. (Witness marks line on map.) The lines that I have now placed on Defendants' Exhibit No. 1 westward from shaft 21, is denoted by the letters "VY."

Cross-examination.

(By Mr. SHELTON.)

The WITNESS.—I had access to the working map of the Pittsmont mine; I was shown two working maps on different scales, showing the various workings, or purporting to show the various workings of the Pittsmont Company. I don't know whether they showed all of the underground workings on the eastern portion of the property known as Application No. 888; they purported to show all of the openings underground on the eastern part of the property, Application 886. I saw a number of openings on these [727] maps, both easterly and westerly from the cross-cut connecting the No. 2 shaft with the No. 3 shaft of the Pittsmont Company. No. 2 shaft, being the south one; and I asked Mr. Williams at that time if there were any other veins intermediate between the workings, and he said no. That was one of the particular things that I questioned him about. He said that his Donner vein was a north dipping vein, and then I questioned him carefully about any veins that were cut by this half mile cross-cut, either northerly or southerly, that could be iden-

(Testimony of Samuel Barker.)

tified with the veins in the ground in question, and he told me no. The half mile cross-cut runs first northwesterly from the No. 2 shaft, and then due north to the No. 3 shaft. The purpose of that was to cut across their Mineral Application 888 until the east boundary of the McQueen placer should be reached, and thereafter the cross-cut extended in their own ground; on the north line it continued practically due north and south. The No. 3 shaft is on the McQueen placer, and about fifteen hundred feet north of the north line of application 888; it is pretty nearly a half a mile between the two shafts. I don't remember now how far the No. 2 shaft is from the north line of application 888. It is nearer the south boundary of 888 than it is the north boundary, as I remember it, and that application is thirteen hundred and twenty feet in width, but it is really thirteen hundred and thirty-two feet in width, as shown by the west boundary of this Butte and Boston placer, which is the east boundary of Application 888. That No. 2 shaft is the shaft being used at the present time; and the north boundary of 888 would pass through the northwest corner of the ground in controversy in this case; that shaft would be a little more than seven hundred feet south of the south boundary of 888.

[728] This working map showed the position of the Donner vein at the twelve hundred foot level, and also at the ten and eight hundred foot level. I don't remember how far that vein at the twelve hundred foot level was south of this north line of 888. I told Mr. Williams to be prepared to give those facts in

(Testimony of Samuel Barker.)

court. I don't know whether this working map gave the strike of the Donner vein at its eastern end, or near the eastern end. I presume the workings were made on the Donner vein, although the drift on the twelve hundred foot level east from this main cross-cut connecting the two shafts, had a northeasterly strike and very much to the northeast, but Mr. Rohn and Mr. Williams and myself discussed where the strike, or what the strike of the vein was in that particular place.

Q. I am asking you whether the map purported to show the strike of that vein.

A. Well, my explanation is that Mr. Rohn and Mr. Williams told me that it did follow out on that vein.

By Mr. SHELTON.—I move to strike out the statement as to what they said.

A. There are no red markings to show where any vein is on the ground.

The WITNESS.—This cross-cut extends south of shaft No. 2, and extends south of the Donner vein several hundred feet. On the extension south of the Donner vein there were no representations of red markings, such as engineers and geologists use to denote veins; there were workings away south of the No. 2 shaft, but I was told they were filled with water and were not accessible on the eight hundred foot level. They were used as a tank for the storage of water—I did not enter the workings myself; my knowledge about them is from seeing the map.

[729] If the Donner vein extends easterly it would have to enter the ground in controversy; it

(Testimony of Samuel Barker.)

cannot be positively stated whether it does so extend without actual development underground, but the developments shown by the workings way to the west, covering a distance of three thousand feet, show that at least in that distance there are no great breaks or throws in the vein, and therefore, it should be extended to the east with considerable accuracy. The absence of breaks or throws to the west is certainly something in point as to what would happen to the east, and to show what the conditions are, and I did not say there were no breaks on the ground to the west. On the contrary, there are several breaks to the west, but the throw of the vein is but a very few feet to each point of breakage. If there was an entire absence of faulting to the west of this four hundred and fifty foot point, why, I should say that the vein could be projected eastwardly without much chance of its being to the north or to the south of such projection, very far; but I said it was broken to the west. I say there are breaks in that vein to the west, but those breaks have been explored and the continuity of the ore absolutely found and identified, and those throws are proven to be from twelve to twenty feet in each instance. The throw in each case depends on the amount of the displacement. But having a series of throws to the west, where workings actually exist, is certainly something upon which to base an opinion as to what the throw would be to the east of the new worked portion of the vein. I would not necessarily expect the amount of displacement to be greater as I approached the summit of the Rocky

(Testimony of Samuel Barker.)

Mountains, than it was to the north or the south; on the contrary, your own maps prove different phase of throw in the [730] Hornet tunnel; the throw there is very small by the fault. I do not know the amount of displacement that is occasioned by the continental fault; but the continental fault is entirely east of the ground in question, or most of the ground in question, and therefore the amount of throw in that fault would have nothing to do with what you find away to the west of there. I would not call the throw between the tunnel 30 and the point that is four hundred and fifty feet west of the ground in controversy a mere speculation—it is speculation though; it is a guess as to whether it would continue on the same course to the east as found in the workings to the west, but from the developments shown in the three thousand feet to the west, the break or the throw to the north and south in that vein is very small and therefore I certainly should venture the opinion that going to the easterly the breaks would not be a great deal more. There are north and south faults—they must be of the same series, and if they are of the same series, that has nothing to do with the amount of displacement in any particular case.

Q. When you speak of the line S-T, denoting the strike of the vein in answer to a question, you did not mean to so testify, did you?

A. I did not say anything about it being the strike of the vein. I was asked to project a line from the shaft 19 through the Hornet Discovery; I did, and I marked it S-T.

(Testimony of Samuel Barker.)

Redirect Examination.

(By General NOLAN.)

Mr. NOLAN.—Well, I will ask him that now—the question asked you would indicate that your explanation proves it would indicate that it was put on there to indicate the strike of the vein.

Mr. SHELTON.—I will object to that, because he has already said that it was not intended to indicate the strike [731] of the vein. I said when I was upon the stand before that there was a lead disclosed in this cross-cut running to the north in the tunnel No. 31, and that in my judgment the lead disclosed in the openings east of there constituted a portion of the system, and that they originally belonged to the same lead; but you are now asking me about lines that were not asked about in the question given me by Mr. Shelton; he talked about the line S-P. I was not underground in the Pittsmont, and it was the engineer who knew of those workings who should figure at what point this Donner lead would enter the ground in controversy. Assuming that the Donner lead enters the ground in controversy at the point marked "C" at the westerly end line of the ground in controversy, and continues its course easterly, it would certainly be the same vein in any connection between it and the lead exposed in the cross-cut in tunnel No. 31, and if the working as shown me on the Pittsmont maps correctly followed the vein on the twelve hundred foot level, why, that working exists in a northeasterly and southwest direction.

(Testimony of Samuel Barker.)

Recross-examination.

(By Mr. SHELTON.)

The WITNESS.—I have assumed that there are no veins on the Pittsmont ground except those that are shown on the map that was shown to me, which purported to represent the workings in the Pittsmont ground, and hearsay evidence of Mr. Williams; whether there were other veins existing, I made particular mention of that fact to him. With your supposition of other veins being there in the Pittsmont ground, it might be possible that with work on your supposed vein, such would connect and [732] become a part of the north vein, so called here, but the features of the two taken in connection with each other, go to disprove your assumption because you have your north dipping here, which is a peculiar circumstance in that country, as I understand it, and you have a north dipping vein to the west and no veins cut to the north or south, some distance of where the Donner vein is in the Pittsmont—no veins existing and no veins cut. In accordance with your supposition, assuming that there are such veins, and that they are both north and south of the Donner vein in the Pittsmont ground, the vein in tunnel 31 is one of those veins, but the facts are not in accord with your supposition; I don't know anything about it only what I got from the maps and the statements made by Mr. Rohn and Mr. Williams. Assuming that the Donner vein enters the ground in controversy at the point C-1, or south of there, and that it had a general east and west strike and had preserved it

(Testimony of Samuel Barker.)

for three thousand feet to the west, and that it continued on this general east and west strike, following the vein to the east, its course through the ground in controversy would be to the south of tunnel 30, but, of course, on your cross-examination of me several days ago, you set up the other idea that there are lateral throws of this vein, either to the north or to the south, and that is exactly what I thought in this case, and you are the one that asked me about that proposition, and I concur with you that there are lateral throws to the north and south in that vein, which would, without very much assumption, prove it to be a north vein that you have in the ground in question.

Q. Let us expand a little on this proposition of the matter of throws. Do you mean by that a dislocation of the vein by north and south faults—do you?

[733] By General NOLAN.—I shall object to the lateral throws of the fault. It is not cross-examination.

By Judge BOURQUIN.—The witness in his eagerness to serve his own side of the case, dragged it in by the neck.

By General NOLAN.—He simply dragged it in by reason of the fact that it was a subject that was discussed, and discussed fully, upon the cross-examination of this witness. I think that we have the movement of this ground over there in every conceivable direction in the cross-examination conducted by Mr. Shelton.

The WITNESS.—You asked me whether there

(Testimony of Samuel Barker.)

were not lateral throws—that is, even after the faulting, wouldn't the ground move either to the north or to the south, and I immediately said yes, and I believe that could happen; I mean by lateral throws dislocations of the vein by north and south faults. The dislocation as you went west on that vein would be to the north, with a normal fault dipping to the west, and therefore, you brought into the examination this very proposition, even after the faulting as we think it should occur existed in the ground, there would not be north and south throws, or as termed lateral throws in the veins, and I said yes, and I think so now. As I went west observing and following out the thing naturally to be expected, the throw would be to the north, as I remember it now. I will have to make a little sketch and tell you what the effect will be; I cannot tell you offhand—my imagination does not reach that far. (Witness draws sketch.) If you have a normal fault action in the north vein, which is north dipping, the continental fault dipping to the west, the portion of the vein to the west of that fault will be to the south of the portion east. In attempting to connect the portions of the vein [734] as I did try to trace it through the Vesuvius, the Rabbit Discovery, tunnel 31, the Olivia and tunnel No. 30, it was not wrong, because I am assuming now a normal fault. If you have reverse faulting, why the very things we find on the ground will be in accordance with the reverse faulting. And now I do not want the record to show that I am claiming that the vein in the south cross-cut in the Vesuvius is this

(Testimony of Samuel Barker.)

same vein, because I never said any such thing. When I answered the question on direct examination I did not assume any particular kind of faulting. The characteristics that I found on the ground are the things that I should say prove to me that they were originally a portion of the same system. As to why the vein throw continues beyond this shaft 21, following still on to the west, I don't know what the conditions are, because there is no work there, and if that is the case, the vein which I refer to as the Donner vein might be south of the shaft 21, instead of extending into it.

Q. And there has been no development of the ground—

By General NOLAN.—We object to that. He has told us about no development of that ground a hundred times now. What is the use of repeating that?

The WITNESS.—There is no development south of that 21 which will enable me to say that the vein does not extend into the ground in controversy, south of that shaft. If I were to take the strike of the vein that is pictured on Complainant's Exhibit 17 in tunnel No. 31, and following along that strike in a westerly course, I would come to a place two or three hundred feet south of the marking indicated as C-1, at least two hundred feet south of it; as the strike is indicated on the [735] map, Complainant's 1u, it would be three hundred feet south of C-1.

Redirect Examination.

(By General NOLAN.)

Q. Notwithstanding the fact that the development

(Testimony of Samuel Barker.)

of the ground has not occurred so as to expose this lead throughout its entire course, I will ask you whether or not, in your judgment, in the light of your experience as a mining engineer, whether this lead—the Donner lead—is not the lead that is exposed in the cross-cut in tunnel 31?

By Judge BOURQUIN.—Objected to as a repetition.

A. Yes, sir, I should say it is the same vein.

(Signed by witness before Examiner April 9, 1912.)

[Testimony of George H. See, for Defendants.]

[736] GEORGE H. SEE, a witness duly called and sworn on behalf of the defendants, testified as follows:

Direct Examination.

(By General NOLAN.)

The WITNESS.—My name is George H. See; at the present time I am night manager of the Western Union Telegraph office,—night operator rather,—they call it night manager. In 1903 I was an assayer here in Butte, and had been an assayer for about ten years before that; in 1903 my office was 119 Hamilton street; I moved in there along in the spring, and prior to that time I was at 57 West Broadway, a portion of the year 1903; I mention that as being in both places in that time; I left the office at 57 Broadway and moved from there to Hamilton Street; I had an office where I carried on my business and did assaying for such people as called for my services, and was recognized as qualified to do

(Testimony of George H. See.)

assaying, and had had experience and training to qualify me to assay. Defendants' Exhibit No. 70 is a certificate that was furnished by me on account of assays made by me; I made the determination of that ore; that is my signature and assay certificate, and that certificate correctly represents the assay values of the sample, as handed to me, of those samples that were handed to me.

By General NOLAN.—We offer in evidence Defendants' Exhibit 70.

By the EXAMINER.—It will be received.

Cross-examination.

(By Judge BOURQUIN.)

The WITNESS.—I had been an assayer about eight years before [737] I made these determinations on Exhibit 70; I was in Denver before I came here; I learned most of my assaying there, under an assay office there. I continued in the assay business about two years after I made these determinations on Exhibit 70, when I closed the office; that is, from that place. I kept up the business though, for three or four years for people whom I knew that wanted me to do their work, in more of a private character. I have been a telegrapher since I was a boy. I had been assaying in Butte from about 1898, I should judge, as near as I can remember, since I did any work, and I moved my office up town. As near as I can remember, I did not do any work here for anyone,—for any mining people, I don't think, until '98. I came to Butte about '96,—about two years, I should judge, and I put an office in down where I live now,

(Testimony of George H. See.)

then later on I gained the regular assayer's license and went up town, and followed assaying continuously until after 1903; all the writing on that is mine. I do not remember anything about the ore, more than I have a way there of designating whether by mail or express or hand samples. I had those certificates made that way. You will note there that those are hand samples, that they did not come by mail or express. I would not remember anything else about the ore.

(Signed before Examiner March 6, 1912.)

**[Testimony of Louis Mason, for Defendants
(Recalled).]**

[738] LOUIS MASON, heretofore duly called and sworn as a witness on behalf of the defendants, being recalled, testified as follows:

Direct Examination.

(By General NOLAN.)

The WITNESS.—I have obtained the sample from the tunnel which I said yesterday I would obtain; I am talking about tunnel No. 36, and have the sample here; here it is. I obtained this sample from four different points, in the tunnel itself, and from the cross-cuts in the tunnel. In the first cross-cut to the north as you go in the tunnel, the face of that tunnel is in granite, altogether different looking material from what is presented there. The granite I encountered and that I am speaking about is not colored green. This material presents itself in the first cross-cut running to the north from the tunnel

(Testimony of Louis Mason.)

on its easterly course,—you go north a distance of about nine or ten feet. You pass through this material which is represented here, and come in a granite formation void of copper colors; I call this sample vein matter,—vein quartz; I could not say as to what mineral it carries by sight, excepting iron,—as gold and silver and copper in some states, is not very easily detected by the eye. I would call the material as it exists there vein matter, and the strike of the vein is very readily determined in the length of that tunnel and cross-cut; it has an easterly and westerly strike, and dips to the south; I want to speak in regard to one piece that is there. It may be questioned as coming from the surface and not out of the lead later on in this case. It is a piece of rock here. In the driving of the tunnel I took out quite a bunch, or quite a [739] lot of this rock and piled it up, and that piece I took out of the pile that I put on the dump a year or two ago. This particular piece was taken out in the running of the tunnel; I took it out of the tunnel myself; this other piece was in place in the tunnel when I took it out this morning. In the first cross-cut, running to the north it crosses the vein, and it is about nine or ten feet, I should judge, wide, at that point; the cross-cut passes to the north in granite, and as it leaves the tunnel in turning to the north, the cross-cut, it starts from granite, and from that point there is another cross-cut running southeast, that is all in granite with the exception of once in a while a little rib of quartz crossing the cross-cut. I considered that

(Testimony of Louis Mason.)

both walls are visible at two different points in this tunnel.

By General NOLAN.—I will offer that in evidence.

By the EXAMINER.—I will mark that Defendants' Exhibit No. 108. When I was on the stand before I presented a sample taken from the opening, —from shaft No. 9 itself. I have a sample here that I took out of the bottom of that shaft in 1896, when operating that shaft under a lease and bond, and I placed this material on the top of the dump and I went to see Mr. Kibby at that time, to get him interested with me, and showed him this same material that I have here. The material I have here this morning I got out of the bottom of No. 9 shaft, at a depth of about forty-nine feet; in 1891 this shaft was sunk to a depth I think of twenty-odd feet,—I don't remember; I have testified here, but I don't remember exactly what feet; it was twenty some feet, I think, and this is the sample; this is stuff that I obtained this morning from the dump, where I placed it when I was working in that shaft in 1895 and '6,—in [740] 1896, where I was taking it out. I went through vein matter in sinking the shaft to a greater depth than it was in 1891, until I reached the depth where I obtained this material, and the vein matter was not at all like this; some of it was a talcy substance; some was of the soft vein granite; that came out of the bottom of that shaft, and the vein matter continues down.

By General NOLAN.—We will offer this in evidence.

(Testimony of Louis Mason.)

By the EXAMINER.—I will mark that Defendants' Exhibit No. 109.

The WITNESS.—That stuff is principally quartz; I cannot say whether it possesses any mineralization further than iron, as I have not assayed it. The Gulf shaft was sunk down to a depth, I think, of twenty-two or three feet from the surface,—that is, the surface level of the ground then, not including dumps around it, and it was about six and a half feet in bedrock, and the square of the shaft was five, I think, by seven,—that is, outside. And the cross-cut north was about three and a half by six and a half high, I should judge, and about nine or ten feet in length, and the shipment which showed those returns came out of the ground excavated out of the shaft of that size and that depth and the cross-cut of the length and size which I stated, and the tonnage shipped is shown in those certificates, but I don't know now what they are without looking at that; I should judge, to the best of my knowledge, that about thirty or thirty-five per cent of the material that was taken out from the time we came to bedrock was shipped for ore. I have reason to believe that Mr. Hoyland, whose deposition was offered in evidence here the other day, is dead; I went to the health office and ordered a certificate of his death and burial, [741] which I can get to-day; his wife is living here in Butte; it runs in my mind that she has been married since, again; she essayed the role of widow of Mr. Hoyland before she married again.

(Testimony of Louis Mason.)

Cross-examination.

(By Judge BOURQUIN.)

The WITNESS.—I testified in this case early in the proceedings; and before I testified I had visited all of these openings repeatedly that I have testified to yesterday and to-day; I assisted in making those openings and was on the ground when they were being done, most always; in my earlier testimony I referred to only some of them, and now I refer to all of them. I brought in samples yesterday that were marked Defendants' Exhibit 95, which I say are aplite; I know them to be what geologists call aplite, and I have known it to be such for a considerable period of time. The texture of exhibit 95, you might say, is identically like the rock in the Modoc, which I called aplite, with the exception of those little white points that is in the rock in the Modoc; those little white points in the Modoc rock is what made me speak of it as peanut candy; I cannot say whether that has any significance as characteristic of the rock; the rock I saw in the Modoc was not called quartz porphyry by other parties better educated than I am, that have been there. Exhibit 95 has none of those points I have mentioned, and no appearance like peanut candy. I got Exhibit 95 on the ground in controversy from a piece of rock that was lying on the surface; the others I got was from an excavation that was made in a roadway leading to the ore bin on the Birtha; the other I got from a shaft that had been sunk [742] on the Pacific claim, still farther up the mountain from the Birtha. I got it out of the

(Testimony of Louis Mason.)

dump that had been made out of the shaft. I would not say my Exhibit 95 was the same character of rock as Defendants' Exhibit 80; I characterize Exhibit 80 as quartz; I think it will show very distinct right here, and if that character of quartz had come in contact with sufficient amount of mineral and water to dissolve it, I presume it would become this sugary quartz; if it was a little more honeycombed, it possibly would be what I term sugary quartz; the rock I have been terming sugary quartz is an iron stain, the same as eighty, but it is not as hard as that; it has become soft and crumbly; possibly this may show more of the crystals than the sugary quartz does. I have seen Complainant's Exhibit 21 several times, and I call that a water quartz; I would not term it aplite; it is different from Defendants' 95 which I brought in yesterday, in texture of the rock; it has a different appearance to me; water quartz is a quartz that you find below water level in veins, that differs from other vein quartz in its clearness and fineness of grain; it is the same character as other *other* quartz except clearer and finer grained; it don't have the appearance of usual vein quartz, and you will find it on all veins that I have worked on, to my knowledge, and I have seen it out on the ground in controversy; I saw it occasionally in the float on the ground, and I saw it in company with this large exhibit that I brought in yesterday from the Rabbit tunnel, which looked very much like it; I think in that large piece you will find pieces very much like this one exhibited here. I testified in the matters of the case 9000 in the state

(Testimony of Louis Mason.)

courts in 1901. The map marked Defendant's Exhibit 2, in case 9000, is very likely the map I testified from and [743] identified the workings that I had done, but in regard to the numbering on the map, I did not put them there. I described where I done the work, and I see now, as you know, that No. 9 shaft is not the same number that it is here, and to the best of my knowledge, I aimed to give it accurately, as near as I could, where I worked and at the time; that is the same map upon which I identified my workings at that trial; I probably saw the piece of aplite that Mr. Clark brought in from the Pacific, stained green, but I don't remember that now; you will find lots of aplite out there carrying copper,—what you call aplite. I would not pronounce Defendants' Exhibit 73 aplite; if you compare that with the sample I brought in here yesterday Exhibit 95, you will see a great difference between the two; I classify them as different rocks; I pronounce 73 quartz,—comparing the two you will see the difference; you will find the like of that in veins; I should call it vein quartz. I sunk shaft 21 last summer, and in determining where to sink it I placed the stake between the Rabbit discovery and No. 9 shaft, and at the hole over the north cross-cut from tunnel 31, and sighted down to the place where No. 21 is sunk; it might vary from a direct line, probably eight or ten feet, but I don't think any more than that; there is a tunnel near shaft 21 running in an easterly direction. Bed-rock in the nearest point to 21, and where the opening is made in the tunnel, is about seven or eight feet,

(Testimony of Louis Mason.)

I should judge, from the surface. I knew that the vein in the shaft 9 and the Rabbit and the north cross-cut of 31, dipped north at a small angle, but I could not tell you at what angle; I have never put a compass on it, but I should judge where it crosses the north cross-cut, I should judge it has a slight dip,—eight inches in five feet I should [744] judge. I dropped a stone and measured, and I think it was eight inches; I was calculating on the vein continuing with about that dip, and I calculated that on the strike I could find it at shaft 21; I was not expecting to find any such depth at bedrock in shaft 21; I expected to get bedrock at about forty feet. I was counting on so much distance from tunnel 30 because in 1896 I sunk a shaft close to tunnel 21 and tunnel 30, and about twenty feet I did not find bedrock. That is shaft 23 on Defendants' Exhibit 1, and I expected to find bedrock at about forty feet, and with the vein standing very near vertical, I did not expect to find very much variation in it. Probably there would have been five feet in forty feet in depth, varying eight inches in five feet, but the hole came up to the surface from the cross-cut north in the Rabbit tunnel, is nearer the north side wall of the vein, or hanging-wall of the vein, consequently the vein lays principally on the south of the line. That hole was at the base of the cross-cut in December when I testified before, but after that date Mr. Kemper, I understand, employed men and drove a cross-cut farther. That hole, with reference to the southern streak in the vein in the cross-cut, was very near

(Testimony of Louis Mason.)

over the southern streak of ore in the cross-cut,—that is, just a streak in the cross-cut that was there at that time; the footwall, in my judgment, is where the cross-cut leaves the Rabbit tunnel and starts north; the whole cross-cut is in the vein in my judgment. At a hundred and ten feet, that I sunk shaft 21, if it maintained the same dip, you might possibly find the vein ten feet north of the line projected, if there was no swing or variation in it, but the vein is large and the line that was projected, being nearer the hanging-wall side or north side of the vein, consequently the greater portion [745] of the vein lay on the south side. I did not cross-cut in those shafts to see where the walls of my vein were in 19 and 21 because I did not have time to do it all; if I had money sufficient to employ considerable help, I would have done it. I did not see any faulting in 21,—no indications of a northerly and southerly fault in shaft 21; I done the work in the bottom of that myself, and there is not; and in shaft 19 the indications are the same, east and west; if you would call a seam like that pencil, twisting around in the talc a fault there would be a fault in shaft 19, but I would not; I consider that the vein, east and west. That piece of quartz, Exhibit 96, I brought from shaft 21,—from the dump, where I placed it myself, and I consider it a good fair sample of the entire bottom of shaft 21; I characterize it vein material,—quartz and talc, possibly some porphyry with it. This material that I found there, would very likely be what I would find in a fault, crushed up kaolin

(Testimony of Louis Mason.)

and the like materials and granite country rock, if there was a fault there, but I dug the material out of that shaft from the time I come to bedrock, and I am frank in telling you I saw no trace of a north and south fault in that shaft. The lay of the formation of the shaft,—I will tell you as I did yesterday,—I would sink down eighteen inches or two feet at one end of the shaft, and then dig that floor out across, and the lays of that material in the shaft was easterly and westerly and dipping to the north, and has the red iron seams on the west end of the shaft, and the east, or the west side, I should have said, and the east side run easterly and westerly. This material is through all of the vein material in that shaft. It is not solid,—one thing, it is all vein matter, the entire bottom of this shaft, from where bedrock begins, with this [746] quartz mixed with other softer material. The quartz does not stand in immediate compact seams or ledge running across the shaft. It is in the vein matter that composes the vein in the shaft. It is broken up and in with the other material, and I would say that is vein matter; I don't care who had it located or who was claiming it. As you go in the tunnel 30 easterly,—you can go in from the entrance of the tunnel proper, now,—there is a cave down through the back of the tunnel, and you go down through this cave, at a distance of probably ten feet west. The material in tunnel 30 is vein matter; from the tunnel south, the greater part of the distance is in this sugary quartz, and at the breast, it becomes more solid and crystallized; some of it

(Testimony of Louis Mason.)

resembles our Exhibit 80, and some of it don't. As I told you, it is sugary; it has become dissolved to a certain extent and crumbly. I heard Mr. Barker give his opinion that that was altered aplite; I claim it is vein matter and not aplite. I do not know exactly how much of the south cross-cut was in that material; I should judge it is about fourteen or sixteen feet, along. The last two feet at the breast, as I stated, there is a small wall running east and west, from that wall farther south it is a harder quartzier nature; that is in the southern part of the southern cross-cut, at the extreme end. I did not observe any fault in that tunnel beyond the southern cross-cut; there is a cross-cut running to the north from that tunnel, as I stated, that is in a hard, blocky formation, and I did not see no fault in that; my investigation was close enough so I would have observed it,—I think I would have seen it if it was there. I brought an exhibit from there, but I don't know the numbers of it; that was the nature of the exhibit I brought; it is not of the same [747] character as our Exhibit 95, the scattered pieces of aplite that were brought in,—there is a vast difference between them; in my judgment their character is entirely different. I found vein matter,—quartz and iron, in shaft No. 2; I considered the shaft entirely in vein matter, and the course was east and west. The portion that shows the greatest amount of iron is on the north side of the shaft, running east and west, and the shaft to the south as you cross it, has stratas of quartz, and this piece that I brought here yester-

(Testimony of Louis Mason.)

day, I took out about two feet from the bottom, from what has been pronounced aplite. I call that quartz, if there is any quartz in the country; these streaks of quartz I saw were running east and west; I did not see any running north and south, unless they call that aplite north and south, and I did not observe any aplite dyke running north and south through shaft No. 2; that is altogether different from what I call aplite and many others call aplite. Right at the top of shaft No. 2 there is a little white streak at the top of bedrock, running north and south on the east side of the shaft; it just shows on the south side, simply a white streak across it; that was not aplite,—I do not think it was. I do not agree with Mr. Barker that the material in that shaft was aplite; we differ in our views probably, in regard to formations. Tunnel 31 has been run at different times in doing assessment work. I ran the north cross-cut in 1910; I think that was the first time I ran any of it. The tunnel was as far ahead of that point when we ran the north cross-cut as it is at the present time, and we had struck the vein on the north side of the tunnel bend, about thirty or forty feet beyond the north cross-cut, and that was my reason for driving the cross-cut north,—was to cut the vein,—the ore that showed in the tunnel farther east.

[748] The object was to run the cross-cut back farther, as near as I could, to be in bedrock and show as much of the vein as I could. I desired that we show a vein on its strike as much as I could, on its strike. I did not say that the tunnel is in vein mat-

(Testimony of Louis Mason.)

ter from where the cross-cut starts north and the tunnel runs in a northeasterly direction and cuts the vein gradually, in a diagonal way, until it penetrates through the vein at the extreme end, I think. I knew of the vein before I got to the bend, but as I stated before, I wanted to show as much on the strike as I could. The breast of the north cross-cut seemingly had passed out of the ore and shows granite, and I should judge that the hanging-wall is reached there, without further developments to judge. It looks to me like the hanging-wall is in sight there. The footwall you will find where the north cross-cut leaves the tunnel, because the south side of the tunnel at that point is granite. As you progress east in the tunnel you continue on the vein until the tunnel stops, or the breast of the tunnel; the breast of the tunnel partially is in the vein and partially it is out of it, in my opinion. There is a talcy seam runs south through the tunnel, about half way between the face of the tunnel and the north cross-cut, but I do not consider that disturbs anything; you might call it a fault or feeder of the vein; it is a break in the vein that is a mere crack; the vein on the east side of it continues on; I do not consider that it changes its course; there is vein granite within the vein there and Mr. Berrien knows and he has examined it too. The hanging-wall is shown distinctly on towards the breast of that tunnel and disappears in the breast of that tunnel in its easterly course; I do not think it changes the hanging-wall; it may have pushed the footwall in, probably. [749] Pushed it in the vein north, probably at that point.

(Testimony of Louis Mason.)

The break of it is partially in the vein and the breast of it is partially out of the vein, in my opinion; the vein is all along that tunnel from the break to the breast; I cannot tell how a fault could push in the footwall and not affect the hanging-wall, but I can judge from my mining on various veins that we find such conditions; sometimes the footwall is not true and sometimes the hanging-wall settles down; I do not think a fault affects the position of one wall of a vein and not the other likewise. You go out in that north cross-cut to the breast, and then you go out and examine the hanging-wall on the north side of the tunnel and a man can easily see that the hanging-wall has its direct course. The footwall is not developed there, where you call it a fault; I cannot say that in this particular instance the break had resulted in punching in the footwall, leaving the hanging-wall where it formerly was. It would probably push in the footwall because the ore body is not so large and strong at that point as it is farther west. I could not say exactly whether it has pushed in the footwall or not; I think it is developed. I do not agree with Mr. Barker when he says that tunnel 31 does not show the vein beyond the break I have spoken of. I stated that that shaft 3,—it is a cut,—was sunk at the time I was working on the Pacific, and I don't believe I know just what it was done. In 3 and 5 it shows yellowish vein matter and quartz and some small amount of copper coloring, and I think they are also on the vein I claim is in 1 and 2 and tunnel 31; that is my opinion. Shafts 4, 12 and 14 are there, on De-

(Testimony of Louis Mason.)

feudants' Exhibit 1; Mr. Dean had a lease on the BIRTHA at that time and sunk those little shafts and shipped some little ore from them; I did not sink 4; here is the [750] one I sunk, just across the line, about eight or ten feet deep; 4, 12 and 14 are also on the same vein that I say is exposed in 9 and tunnel 31. I don't know who sunk 15; that was underground probably four or five feet, not into bedrock. I don't think I testified at the former hearing in case 9000 that I sunk shaft 4, and that it was the fourth shaft I sunk, and that I sunk it on the BIRTHA. I sank shaft 19 in August, 1911,—probably part of it was in July. I determined the location for sinking that shaft as near as I could judge with a line of the workings easterly from that shaft as it is to-day; I did not set up any stakes and slight along them to find a location for it; that shaft is about eighty-seven feet deep, I should judge. I sunk that shaft in a line with the Hornet tunnel workings and the various tunnels and shafts, as near as I could by looking up over the ground. I could not say exactly whether that was about the same course as the vein in the Hornet tunnel by the compass, because I have never tried a compass on the vein out there; I should judge it to be near that looking at our exhibit 1. In tunnel 35 I should judge bedrock would be about twenty-three or four feet. I have made no calculation as to how deep I would find bedrock in shaft 19; I thought I would find it about forty or fifty feet. I made no allowance for the divergence of the vein south by reason of the lower bedrock there, in fixing the loca-

(Testimony of Louis Mason.)

tion of shaft 19; as near as I can remember I came down to that portion and sunk the shaft, and in a line as near as I could look eastwardly, and started work. I should judge my vein in the Mullins tunnel has a dip of forty-five degrees,—about half pitch; in every foot we descend it would carry the vein one foot south; you take a direct line east and west and you will find that shaft 19 is quite a ways south of a [751] direct line from the Hornet. My vein as already disclosed as I conceived in the Hornet tunnel, tunnel 37, 35 and 36 was not running directly east and west. As to the strike, I said a minute ago that I never put a compass on it, but it has the appearance of being slightly northeast and southwest; we struck the vein in the 19 about eighty feet deep. As to whether if we had the same dip on the vein there that we have in the Hornet tunnel it would throw it very much south of a line on the vein through those various tunnels at that depth, you go down in the Mullins inclined shaft till you come to a depth with the east and west line with eight feet below the surface at shaft 19, and you will find you are pretty close east and west; I could not say exactly that the vein in the lower workings is running northeast and southwest on the actual strike; I think it varies to the west more. We started shaft 19 on the theory that we would get bedrock at about forty or fifty feet, and we went at least thirty feet below our outside limit of fifty feet before we struck bedrock in the vein,—and that is farther west than the Hornet,—a distance of probably seven or eight hundred feet.

(Testimony of Louis Mason.)

The vein may have swung from the strike of it that it has in the Hornet tunnel as it goes westerly; I cannot say whether the vein would be thrown in eighty feet depth in shaft 19, thirty feet south of where I expected to find it at fifty feet, because the directions are not direct through. I calculated we would cut the vein at forty, and I got it at eighty; it might have swung there,—I can't tell; it is not opened all the way through. I found vein matter and talc and quartz in shaft 19; it is not there in small veins; the entire shaft is within talc and quartz, and portions of the formation is harder than the talc,—looks very much like porphyry, and again the [752] quartz I found there is broken up and mixed in with the other material, such as you find in the veins near the surface; there is no faulting in that; the material there in that shaft is such as we usually find, near the apex of the veins in Butte; the material in the fault which you speak of so often in the Rabbit tunnel is different from the material in shaft 19. I do not think that the material in the bottom of shaft 19 is what you generally find in faults,—crushed material,—by reason of the fault movement. I saw copper in that shaft; there is a sample here that will show,—one of the pieces,—quite a little copper, which I got out of the bottom of the shaft, and it is a fair sample of all the material in the bottom of that shaft, excepting the piece that has the copper in it. I did not see any other piece that had copper in the rock. I don't think there is any altered granite in this sample; there is no talc in this sample 100, because the

(Testimony of Louis Mason.)

talc if I mixed it up in the same sack, you could not tell which was talc and which was the other. It would be all jumbled up. I did not get a fair sample of the material in the bottom of shaft 19; a great deal of this was not material that had slid off at the sides and at bed rock; the sides of our shaft 19 had not caved; that is a sample that I took out before I quit work and placed on the top of the dump,—oh, the sides had caved; I took that material off of the dump, where I placed it myself; I could not say just how many days it had been there. I finished that shaft in August or September. A portion of tunnel 35 was run in 1901, and a portion of it was done probably four or five years prior to that date; bedrock shows in the bottom of tunnel 35 for a distance of about ten feet; the face of the tunnel is cut into bedrock, probably two feet and a half to three feet deep, and there is a short [753] cross-cut to the north, about five feet before you reach the face of the tunnel; the south side of the tunnel is granite,—from the south side, north, and through this cross-cut I consider vein matter; it is quartz porphyry; it is mineralized and has quite a little iron stain showing in it; it does not show copper,—that is, no green copper. The north cross-cut at the breast shows a wall running east and west, dipping to the south; there is iron in sight there. I thought I had a sample from 35 in December, when I was on the stand; I did not bring one this time, because yesterday I thought I had a sample from 36; I did not see any aplite in tunnel 35; I call that a quartz porphyry; I saw no

(Testimony of Louis Mason.)

sugary quartz in there like in tunnel 30; there are some parts of that resemble our exhibit 80,—shows the crystals of quartz, like Exhibit 80,—you can see the quartz crystals in that exhibit right there. I do not think the material in tunnel 35 is aplite; tunnel 36 I consider has considerable quartz porphyry in it,—I found a vein there in the first cross-cut to the north, a distance of about eighteen feet, I think the cross-cut is,—there is a vein shown there about nine or ten feet in width, and the material is composed of vein matter; it shows considerable iron staining, and I never assayed it; I could not say as to the other minerals; it is quartz; it does not resemble this sugary quartz so closely, and there was granite there; the south cross-cut from this north cross-cut had,—runs southeasterly,—is entirely in granite, with occasionally a strata of quartz running across the granite, in the face of the cross-cut that runs to the north shows the granite. I saw stringers of quartz in tunnel 36, but cannot say how many; the vein matter is about eight or nine feet across, and I consider it solid vein matter. At the north side there was [754] probably a little separation from the foot-wall, and maybe six inches of the softer character, different a little from the rest of the quartz and vein matter; this was a little different from that in the north vein. I consider it vein matter,—vein quartz, as we see in all the veins in Butte; it resembles the quartz portion of Defendants' Exhibit 80; that is broken fresh where you can see it; it differs from the sugary quartz some, but I cannot analyze how; I am

(Testimony of Louis Mason.)

willing to tell you anything that is fair and right; I determined it looked different by looking at it,—the same as that table looks different from this table; I think there is more iron in it, but I do not consider it is any softer; it was not aplite that I saw in 36. I brought an exhibit from tunnel 36, this morning,—109, I think. I got one piece of it, as I stated on direct, from where I placed it on the dump, and I got another portion of it from the first cross-cut to the north; and I got a part of it in the extension of the tunnel going on east, and another part of the sample in the cross-cut to the north, again further on in the tunnel. Exhibit 108 is a fair representation of the vein in tunnel 36. I do not think you ever saw a vein that did not occasionally have a lump of granite in the vein matter. I don't know whether there was any altered granite in our exhibit 108, from tunnel 26, and I don't know if there is any aplite in it; I don't think the whole of it is altered aplite and granite. I could not say vertically at the breast of the tunnel how deep tunnel 36 is,—I should judge it is about fifteen feet at the face of the tunnel; I saw copper there in one point, on the hanging-wall; south of the hanging-wall is granite. The hanging-wall, as it is generally termed, is the separation between the vein and the country rock; usually there is talc between them. [755] The hanging-wall was granite; I saw the green stain of copper on the talcy surface, vein matter, but I don't know how far it penetrated into the granite,—I did not see it on the hanging-wall; it was on the talcy surface of the hanging-wall

(Testimony of Louis Mason.)

of the vein; the hanging-wall country rock is granite, and the vein itself is a smooth surface, and I saw it on the smooth surface of the hanging-wall side of the vein; it was on the hanging side of the vein itself. Mr. Kift and Mr. Knoyle, I believe, ran tunnel 37; I examined it, and found some very good copper ore in that upper cross-cut and vein matter; parts of the north cross-cut is in vein; it is filled up to the top of bedrock; I could not say whether it is entirely in vein or not. I stated that the south side of the tunnel, as it goes in there, where the north cross-cut leaves, was in granite, a long time ago; I saw that before it had caved and filled up; I consider the material in the north cross-cut vein,—very good. Some streaks very good copper ore,—it is quartz and porphyry both, and there is granite to the south; there might possibly be small pieces of granite occasionally in the vein matter in the north cross-cut. I do not think there is any aplite in that north cross-cut; the quartz I saw there is not what I call the sugary quartz; it is not dissolved or ravelly like the sugary quartz. I could not say that the material in the north cross-cut in tunnel 37 resembles Defendants' Exhibit 80; bedrock is only exposed at the present time for about a foot to sixteen inches, so it is hard to judge; there is some clear well-defined quartz in it; I noticed that right at the surface of bedrock, in this vein matter which I produced a sample here; you can see quartz in that. I would not say that the material in the cross-cut north from tunnel 37 is like Defendants' Exhibit 80; I consider it [756] quartz

(Testimony of Louis Mason.)

porphyry in there; I should call Defendants' Exhibit 80 vein quartz. The strata running east and west in that north cross-cut, a foot wide, is much more rich in copper than the material enclosing it on both sides; the copper was impregnated all through the rock,—green in color. I did not measure the vein in tunnel 37, but you come to the cross-cut at the shaft beneath the Hornet tunnel and the distance from tunnel 37 to the shaft beneath the Hornet tunnel, I did not measure; the vein there I should judge to be about thirty-five feet wide; the south cross-cut from tunnel 37 is filled at the present; I was in there a few years ago. I cannot say how wide the lead is where I took our exhibit 102, six or eight feet west of the face in the Hornet tunnel, because the hanging-wall is not yet exposed; I think the lead is about four inches. I took it from what has been classified by Mr. Winchell, I think, and Mullins as the hanging-wall. I took 102 from right where you asked about, six or eight feet west of the face of the Mullins tunnel, and at that point I took exhibit 102 out of the hanging-wall. I told Colonel Nolan on direct examination that I took that out from what Winchell called the lead, but I say it is the hanging-wall; I took it from the lead as Winchell termed it; I took that out of the vein, as Mr. Winchell called it; I called it the hanging-wall; and the other sample was taken out of the stope below the Mullins tunnel, and out of the wall that Mr. Winchell, I am pretty sure, called the hanging-wall; Mr. Winchell called that the hanging-wall, but I say it is not. There was nothing on the north side of

(Testimony of Louis Mason.)

what Winchell called the hanging-wall; I run that tunnel myself and at that point I did not remove any ore from the north side of what Mr. Winchell says is the hanging-wall; I drove that tunnel myself, in the footwall [757] country rock, and that wall that Mr. Winchell calls a hanging-wall is still there as I left it, and it goes on northerly with reference to the roof of the tunnel; it appears in the roof, but there is no ore in the roof; I took it at a height of about four feet from the bottom; I said I took Exhibit 103, or whatever it is numbered,—is from the hanging-wall as Mr. Winchell testified, in the stope beneath the Hornet tunnel; I do not consider that the hanging-wall. There is a space probably sixty or seventy feet in an easterly and westerly direction from where the two samples were taken, and the sample from near the breast of the tunnel I took out of what I called the hanging-wall, or the footwall,—is what I meant all the time. I drove the tunnel in the country rock underneath the vein and the wall that is there, and Mr. Winchell called it the hanging-wall, and I do not call it the hanging-wall. You will find in my testimony there, it is the footwall, and I took my sample out of what I call the footwall.

By Judge BOURQUIN.—Move to strike out as not responsive. Read the question and see if he will answer it.

A. I think that is responsive.

Q. You mean you took 102 from the footwall, instead of the hanging-wall?

The WITNESS.—Yes, sir.

This exposure of the footwall, from which I took

(Testimony of Louis Mason.)

exhibit 102 was from about six or seven feet west of the breast of the tunnel, on the south side of the tunnel; the hanging-wall is not on the south side of the tunnel; there is where you tried to mix me up on that awhile ago. I say the south side of the tunnel is the footwall, and the tunnel is drove in the footwall country rock; there is no exposure of the vein there to any [758] extent southward toward the hanging-wall; I took this exhibit from the footwall out in the vein; I understood Mr. Winchell to call that the hanging-weall; myself and others drove the tunnel at that point,—we were looking for ore; driving outside of the footwall instead of in the vein is very often done in driving tunnels or levels; I drove under the footwall and farther west as I had ore; I took the country rock out from under the wall and took my ore down clean. This streak that I shipped. I was driving it to take the streak of ore I was following clean. The vein shows in the south of the tunnel; it is not entirely south, because the vein shows on the south side; and when I drove there I left the ore still standing in the face on the south side of the tunnel; I was enjoined at that point and stopped from working. Exhibit 103 I took from out of the stope underneath of the Mullins tunnel from what Mr. Winchell called the hanging-wall, at three different places. I had a sulphide ore sample here from the dump made in mining out the Mullins shaft; I should judge the Mullins shaft has not been worked for eight years; that is not the same character of ore as is in the upper workings of the Mul-

(Testimony of Louis Mason.)

lins tunnel, because it is below water level, in the sulphide zone. I took exhibit 107 about eighteen feet south of the Vesuvius shaft; the vein there is very near vertical,—possibly a little shade to the north; I should judge it is eight inches to a foot wide there and is in granite, both sides, and we have granite on the south of it; south of this richest streak, a couple of feet or so, there is two or three other stratas of quartz, mineralized, running east and west, and there the mineralization seems to cease. I think it is the wall, and is about two and a half or three feet farther south. At a distance of about thirty-five feet north of the Vesuvius [759] shaft there is a strata of real brown iron stained vein matter, a foot or so in thickness, running easterly or westerly and across the cross-cut. And then about seven feet or eight farther on in it, there is another brown stained strata a foot or so thick of vein matter running easterly and westerly across the cross-cut; one of these streaks shows a little incline to the north, and the other one is pretty near vertical. We do not cut them at all with the streak that I saw in the south cross-cut of the Vesuvius; there is country granite between them. In my opinion, the openings not being made, that those streaks of vein matter on the north side of the Vesuvius shaft would be the extension easterly of the Rabbit vein. There were green stains in the south cross-cut; that vein has quite a good deal of copper stain in it,—not to any extent as you go farther south from it; there is a slight stain as you go south,

(Testimony of Louis Mason.)

but very little; the granite becomes more hard; in the Vesuvius there is one vein south and there is a vein north, in my opinion, of the Vesuvius shaft; the one on the south dips north just a shade from the vertical; I could not say that it would connect up with the Hornet vein; it has a different dip, and much smaller; the Hornet vein on its course would be quite a distance south. I notice that in case 9000 I testified that the vein in the Pleasant View discovery and the Hornet vein was one and the same, but I surely did not understand the question, because I had done this work all along the vein of the Hornet on the south side, and if I had been on guard and watched the question, I would not have answered it that way. I testified that there is a body of quartz in the Pleasant View discovery shaft on the north side; quartz is supposed to be vein matter. I know it is vein matter in the Pleasant View discovery,—if that quartz [760] continues, it will be a vein; I think it was a vein in the Pleasant View discovery, and would consider it a vein until I saw it from development. It is a distance of about nine hundred feet from there to the southern Vesuvius, and I could not connect it up with the vein shown in the southern Vesuvius. I cannot say whether they are separate veins. The Rabbit vein and the Hornet vein are exposed in the Butte and Boston placer; the little vein in the Vesuvius touches the Butte and Boston placer; and the Pleasant View discovery, as I say, I consider it a vein until it is proven different. There are four points exposed in the Butte and Bos-

(Testimony of Louis Mason.)

ton placer. I testified on direct examination that the openings, shaft 19, tunnels 35, 36 and 37 and the Hornet workings were all, in my opinion, on one and the same vein, but, of course, there not being a continuous opening or connection, I could not say positively; I should judge that we have the vein determined for something like a thousand feet along there,—the south vein, and to that extent I know the vein exists there.

Q. Well, reading from your cross-examination when you were on the witness-stand before, page 203, you were talking about the Hornet vein and this question was put to you:

“Q. Now, of course, you would not undertake to say for what distance this vein runs to the east or west?

A. No, sir, I do not think any man could say that.

Q. Except for the distance that it has been exposed?

A. I cannot speak any farther that it is exposed.

Q. There is nothing on the surface to show it any place except where the original surface has been opened, dug into?

A. Not with the exception as I speak of, this reef of rock at the upper end of this ground.”

[761] The WITNESS.—I remember so testifying, as I did just now. I just stated that in my opinion the vein extends for at least eight hundred feet, but I could not say positively when it is not a continuous opening; I think that is just the same, covers

(Testimony of Louis Mason.)

the same ground as the other answer that you read there. The material north of the footwall in the face of the Hornet tunnel is granite; it has a slight stain, but very little. I did not see any material in the upper cross-cut from the Hornet tunnel to the Hornet discovery like that in the footwall; I consider that from the Hornet tunnel to the Hornet shaft is in vein matter; there is some vein granite, as miners call it, with the rest of the vein matter; I do not think it is the same as what lies in the footwall of the face of the tunnel. I, with others ran tunnel 32 on Defendants' Exhibit 1, and tunnel 33. When tunnel 32 was run, it showed no vein, but since that tunnel has been run, the south side of the tunnel caved off or fell in, and leaves a strata of vein matter, apparently running east and west in that tunnel; I think it is in vein matter,—quartz; I have never picked into it to examine it; you can see the walls plain; I do not know how wide it is; I don't know that it is cut into or not; it has the appearance of a vein,—looks like the side of a vein; I am satisfied it is vein matter. I noticed the fault in tunnel 32,—what has been called faults here a great deal,—north and south, a strata of talc crossing tunnel 32, and some crushed up quartz and country rock in with the talc; there is hard substances in the talc, something like five feet across; simply because it runs north and south does not signify that it could not be a vein; I would call it a north and south vein, and shows signs of iron. Exhibit 109 came from off the dump of shaft 9, where I placed it in 1896. [762] I

(Testimony of Louis Mason.)

characterize this material as vein material and quartz,—vein quartz; I don't think there is an altered granite in that; I think it came from the bottom of the shaft; that sample looks principally like vein quartz to me, altogether. In 1891 I think I sank that shaft somewhere to a depth of eighteen or twenty feet,—in the neighborhood of twenty feet,—in April, 1891. I sank somewhere in the neighborhood of seven shafts before May 11, 1891; I testified to one that was about nine or ten feet off of the ground on the BIRTHA, just north of No. 9 shaft. They are on Defendants' Exhibit 1,—1 and 2, and 9, this one on the BIRTHA about ten feet from the line here (indicating on map),—I presume that is 8 on Defendants' Exhibit 1; and the Hornet and one southwest of the Hornet, a short distance, and one northwest a distance of about eighty feet; to the best of my knowledge that is all I sunk on the Butte and Boston placer and the BIRTHA before May 11, 1891. I did not speak of No. 19 because it never went to bedrock. I am not certain when I sank that, but I think it was the first work that was done. That was only down about eight or ten feet,—a day's work. The surveyor placed the numbers on Defendants' Exhibit No. 1, numbered them as he took the survey, without any directions from me; I never told him to number them at all. I could not say how deep shaft 9 on Defendants' Exhibit 1 was before May 11, 1891, but I think it is somewhere between fifteen and twenty feet; I timbered it in 1895 and '6, when I leased the ground with Mrs. Hopkins and

(Testimony of Louis Mason.)

enlarged the shaft No. 9, timbered it and sunk about forty-eight feet deep.

[763] Cross-examination.

(By Mr. SHELTON.)

Q. Mr. Mason, I wanted to call your attention to the map that was marked Defendants' Exhibit No. 2. As I understand it was used in the hearing in the application for injunction, case No. 9000 of the District Court. I will ask you to look at this and see whether you recognize it as the map that was used at that hearing.

By General NOLAN.—We object to that as repetition.

By the EXAMINER.—I think he has answered that question.

Q. I simply wanted to ask you farther about it. Do you recall that as being the map?

A. I think it is the map, although it has not been in my possession.

The WITNESS.—I might have had a sketch of some kind, or some kind of a paper in my pocket on that hearing; I could not say whether I was examined regarding that sketch and designated the position of the shafts; it has been about eleven years, and there is a lot of different notes and markings like in this trial here that I have not preserved, and I could not say exactly.

Q. Well, I will ask you if you testified concerning the designation of the shaft as follows at that time: This is from page 124.

“Q. These designations and numbers of the

(Testimony of Louis Mason.)

shafts on this map (referring to Defendants' Exhibit No. 2), state whether or not they are the same as those that Mr. McBride requested you to put on that other map?

A. They are to the best of my knowledge."

The WITNESS.—I have no doubt I so testified.

[764] Q. Now, page 24, concerning the depths to which you claimed to have sunk the three northerly shafts at that time, I will ask you if you testified as follows:

"Q. Did you discover any of this vein,—any of this portion of that vein before they made their application for placer title?

A. Well, I sunk three shafts to a depth of from eight to ten feet in April and about the first of May on the north side.

Q. Of what year?

A. 1891."

The WITNESS.—I no doubt so testified; those three shafts were on what I now call the north lead; it is known now, I think as 1, 2 and 9; I could not say exactly what the depth was to bedrock from the surface at 9, but I know I went down in bedrock some distance in 9; 9 is one of the three shafts; I presume bedrock would be within eight or ten feet from the surface.

Q. Now, concerning the same matter, referring to the same matter, I will ask you if you testified as follows, at page 126:

"Q. In your former examination, you made the following statement relative to the shaft you des-

(Testimony of Louis Mason.)

ignated as No. 6, and I would like to know where, upon that new map, Exhibit No. 2, that shaft is. I will read your testimony upon that point. You said in relation to the shaft that you sunk: 'I sunk them down below, out here, (indicating) somewhere about ten or twelve feet. Q. And how far distant from the Point of Discovery? A. About one hundred and twenty feet probably. Q. One hundred and twenty feet west? A. Yes, sir, west. Q. How deep did you sink there? A. Ten or twelve feet. Q. Now mark that [765] No. 6, where you sunk your last shaft. (Witness marks figure 6 where last shaft was sunk.) A. And sunk that down there ten or twelve feet. Q. And what date? A. In May, 1891.' Now, mark that No. 6 where you sunk that last shaft in May, 1891. Where is that shaft?

A. I think you will find that right here (indicating). The number is not marked, it is marked shaft five by six,—that is the size.

Q. And that is the shaft you refer to as shaft No. 6 on the former map? A. I don't know what is referred to in the testimony as 6, but I sunk that shaft down to a depth of ten or twelve feet, then later on I sunk it deeper in the fall of the year.

Q. You identified the shaft which you have pointed here, as a shaft north of the tunnel on your Exhibit No. 2, the No. 2 shaft, shaft five by eight? That, I think, is the size of the shaft at the present time.

Q. Well, that is what is marked on that map?

(Testimony of Louis Mason.)

A. Yes, that is what I understand to be the size, but the information was that that last shaft—

Q. Was that the last shaft you sunk in 1891?

A. I didn't sink that shaft in 1891. I said I sunk that to a depth of ten or twelve feet in 1891, but later on, in the fall or winter, I said I sunk it deeper."

The WITNESS.—I so testified, and I think you will find I testified just that way since I have been on the stand again. There is a shaft marked 16, about that point, but there was another shaft sunk very close to shaft 16, that is marked on this map, by Mr. Kift and Mr. Knoyle, and it is filled up likewise at the present time. That shaft is marked four by eight, just north of the Hornet tunnel; I think I testified that was [766] the last shaft I sunk just prior to May 11, 1891.

Q. That was the last shaft that was sunk in 1891—as a matter of fact, that was the last shaft that was sunk in 1891?

By General NOLAN.—What shaft are you talking about? It is hearsay evidence, unless it is rebuttal or contradictory of some evidence the witness has given on the stand. Really, I am going along myself in the dark as to where the contradiction comes in.

By the WITNESS.—He is asking me the same question that has been asked me five or six times in regard to that shaft.

By Mr. SHELTON.—This is for the purpose of impeachment, of course. This is part of his testimony, and later it will appear from his testimony

(Testimony of Louis Mason.)

that he sunk this shaft on the 11th of May, 1891.

By General NOLAN.—But there is testimony here in reference to those shafts, in reference to their condition in 1891, and so far as that is concerned, there is some testimony here in reference to all of these shafts. Now, really, if there is any contradictory testimony, let's have it. Let's not be groping in the dark this way. The evidence thus far, I do not see where it is contradictory at all.

By the EXAMINER.—Perhaps it is just preliminary.

By General NOLAN.—But all this stuff, by the time we get through with it, might all be said to be preliminary, as far as impeachment testimony is concerned. As far as that kind of testimony is concerned, no preliminary is called for at all. "Mr. Mason, you have testified that shaft so and so has certain dimensions. Did you testify it had some other dimensions at some time—that this shaft had some other dimensions?" That is the way you proceed with impeachment questions. This preliminary business has no application at all here, except to kill time.

[767] By Mr. SHELTON.—There is no objection to killing time.

By the EXAMINER.—We will have to let counsel pursue his own methods.

By Judge BOURQUIN.—Here is the proposition. Here is a number of shafts that he testified about in the old hearing, that he sunk before the vital date. There are discrepancies between his testimony then

(Testimony of Louis Mason.)

and now, and this can only be made to appear by questioning him as to his testimony at the other hearing.

By General NOLAN.—I agree with you there, if there is any discrepancy at all, the rule is, unless it is in reference to a material matter, the discrepancy should be designated, but as a matter of fact, as we go along here, it appears that anything that is read from this contradictory, I will not object to it, but seemingly there is not any contradictory evidence that is palpably disclosed. Of course, you can get all this record taken in 1900 in this hearing.

The WITNESS.—The timbered shaft is a shaft situated about ten feet south of the south end line of the Copper Queen—the shaft marked No. 3, four by seven by forty-eight on the map, I think is the only timbered shaft I testified about on the former hearing.

I testified on that hearing as follows: “Q. What year was that lease and bond taken in? A. In 1895. This shaft that we sunk and timbered up here was a shaft that had been worked on two different times before. I first sunk it about ten feet in April, 1891, and in 1896, we sunk it down to a depth of thirty feet, and then following after the settlement of the ground, Mrs. Hopkins and I bonded Mr. Mullins’ interests and Mr. Hamilton’s interest, and sunk the shaft to a depth of about forty-eight feet.” I testified this time that the shaft [768] was worked on three different times, and that *he* had been sunk in 1891, and before May of that year to a depth of about eighteen feet, and I did not say any other place that

(Testimony of Louis Mason.)

it was not sunk before May, 1891; I do not think you can find it where I did; it is sunk in April, 1891. I should judge it was deeper than ten feet—I know I was in bedrock some distance. I aimed to give the facts then, and I aim to give them now to the best of my ability.

I testified that time as follows: “The shaft that you have so marked No. 3 on your map is a timbered shaft, is it, and it is about thirty or forty feet deep? A. Where is it situated? Q. In what— A. Yes, sir. That shaft is about forty-eight feet deep, and I stated before that that shaft had been worked on at three different times. Q. So that prior to May 11, 1891, it was not more than ten or twelve feet deep. Is that your proposition? A. On shaft No. 3, you mean? Q. Yes. A. That was about ten or twelve feet in April, 1891. Q. Yes—was it any deeper than that on May 11, 1891? A. No, sir; it was not worked in again until 1895, to the best of my recollection.” I do not see any difference in that than what I have testified now.

Concerning shafts 1 and 2, on page 39, I testified on the former proceedings as follows: “Q. Where did you go to work? A. I first started to work right along about here (indicating). Started first probably between fifty and seventy-five feet, something like that, from this line over here, from the northeast line of the Butte and Boston placer, and the south end line of the Copper Queen. Q. Now, mark shaft No. 1. (Witness marks shaft No. 1.) A. I sunk down there probably ten feet, and I discovered a lead,

(Testimony of Louis Mason.)

and then I went probably fifty feet— [769] Q. This shaft is over here somewhere (indicating). A. Yes, sir. Q. And how deep did you sink it? A. About ten or twelve feet. I sunk that on or about the 18th or 20th of April, 1891. Q. Ten or twelve feet of a depth? A. Yes, sir.” Them two shafts was cleaned out this fall. Mr. Berrien was there when I cleaned both of those shafts out and saw an old shovel laying in the bottom of each one of them, that was rusted and at about the same depth as I testified to. My statement which you read that the shaft was sunk in 1891 about ten or twelve feet I think is correct.

No. 4 shaft over on the Copper Queen, at the time I testified on the other hearing was not over twelve feet deep. I no doubt testified on the former hearing that the discovery shafts 1, 2, 3, 4, 5 and 6 were all of the shafts that were put down there on that ground prior to 1896, and that Mr. Kemper had a shaft down somewhere about here (indicating) somewhere in the vicinity of the mark K-2; and that that was pretty close to the bounded corner of the Bullwhacker claim, and that those were all the openings on the Pleasant View, but the way you read the questions and answers there, you cannot come to an understanding whether you are alluding to shafts that I sunk or shafts that Mr. Kemper sunk. I think shafts 1, 2, 3, 4, 5 and 6 are the shafts indicated on Defendants’ Exhibit 2.

On that examination I testified as follows concerning the date of the sinking of the Hornet shaft: “Q.

(Testimony of Louis Mason.)

Where was the next? A. I came over this way (indicating) here, and went to work. Q. Now, where is that? A. That is about a hundred and sixty or seventy feet, something like that, from the north line of the Bullwhacker claim. Q. How far was it from shaft marked here Hornet Discovery? A. Well, that is the shaft [770] itself. Q. You will mark that No. 5. A. I will make it No. 5. Q. And what did you do there? A. I sunk that shaft down to about twenty-nine or thirty feet. There was a windlass on it. Q. Who assisted you in that? A. Grant Pore and Eli Rea. That was done between the 1st of May and the 10th of May. One of the parties that was working for me there, I paid him off, and I think it was on the 12th and he went back east." You will find later on I produced the time-book and it showed the 10th of May that I paid him, I think. I think the statement as you read it is correct. I completed the work on shaft No. 5, the Hornet Discovery shaft, before the 12th of May,—the work was done between the first and the tenth of May, 1891.

I also testified as follows on the former hearing: "Q. Now, what do you know about the Hornet shaft and its original sinking? A. If I am not mistaken, that shaft was begun about the second or third of May, 1891, and sunk to a depth of thirty feet. Q. I will ask you what was the date you said that was located or sunk. A. I think I begun, as near as I can remember about the second or third of May, 1891, to sink it"; that statement is correct, that I began about the first to the tenth of May.

(Testimony of Louis Mason.)

I also testified as follows on the former hearing:

“Q. Well, is that the last shaft you started in 1891?

A. I don’t remember for certain whether it was or not. Q. But you are certain that you sunk it in 1891,

ten or twelve feet and afterward sunk it deeper? A.

Sunk it deeper, I said. That is here (indicating), the shaft marked five by eight by twenty-nine”—that is the shaft northwest from the Hornet shaft.

I also testified as follows on that hearing: “Q. Mr. Mason, do you know what time, of your own knowledge, that that ore [771] that was in the sacks on the surface of the Hornet Discovery was thrown back in the hole? A. Well, I think it was about the ninth

or tenth, for the reason that— Q. Of what? A. Of May, 1891. I was not present, as I stated before.

The parties that I had employed that day stated that.

Q. Now, we do not care what they stated. I believe you went over that about the matter with Mr. Kemper.

A. Yes, sir. Q. But, of your knowledge, when that ore in the sacks was thrown back in the shaft,—

of course, if you have any way of refreshing your memory, you may state it. A. I have not a memorandum of the exact date, but I went out there that

same evening of the day that I was informed that the notice had been posted, and it was destroyed or

thrown down the shaft. I went down the shaft,—I think you will find I testified to that before,—and got

the notice,—it was torn up considerably,—and put it together and read it, but I did not keep it and do not

remember the name that was signed on the bottom of the location notice. Q. What connection is there be-

(Testimony of Louis Mason.)

tween that and the casting of the ore back into the shaft? A. Well, I threw the ore down the shaft at that time, poured it out of the sacks down the shaft." There was lots of ore on the dump and through the material taken out of the shaft. The ore that was in the sacks was not carried away; I think that was the ninth or tenth of May, 1891. The date of the completion of the work on the Hornet was before the tenth of May. I think I begun the work on the shaft to the southwest of the Hornet first,—that is to the best of my memory.

Q. You think you began the work on the one southwest. Well, now, Mr. Mason, I will read you the whole of your testimony as given.

By General NOLAN.—The whole thing?

[772] By Mr. SHELTON.—We do that for the purpose of furnishing the context of those portions that have been read.

By General NOLAN.—We shall object, except in so far as the testimony is contradictory of testimony now given.

By Mr. SHELTON.—You read the whole of Mr. Mullins' testimony.

By General NOLAN.—Of course I did that simply because my attention was called to the fact in the cross-examination of Mr. Mullins that I might have done him an injustice, his testimony in one place showing that he had not been down in those shafts at all, and then my attention being called to his testimony in another portion of the record, so that I could not be considered as not fair, I read all the evidence,

(Testimony of Louis Mason.)

—for the purpose of contradiction, but for the purpose of showing that I desired to be fair to him and read the testimony that seemed to be contradictory of the testimony that I was impressing *upon* his attention as impeaching evidence. Of course, in this instance, if there is anything to be subserved by reading the testimony, in so far as it is corroborative he gives here, it is simply encumbering the record. However, it goes in.

By Mr. SHELTON.—We have not any desire to encumber the record, but we think it is better to have it all in the record so that there cannot be any mistake about what he testified, or the meaning of the part that was read. When the matter comes up for hearing, we do not want any argument, unnecessary argument, as to the parts we have read. The parts I have read relate to the depths of the shafts which were opened prior to May 11th, 1891, and also shows the number of them, taken in connection with the map, shows six shafts,—in reality only five were completed before the 11th of May, 1891, and those are not of sufficient depth to have gone into bedrock, according to the weight of the testimony.

[773] By General NOLAN.—I shall object likewise to the evidence, except in so far as it is shown to be correct. Now, of course, you can get into this record any of this evidence that is admitted to be correct by the witness. There is palpable error in this transcript, as it seems to me, and I shall object to all of this going in as evidence, unless there is some proof here to the effect that Mr. Mason so testified.

(Testimony of Louis Mason.)

By Mr. SHELTON.—Well, I presume that the proof can be furnished. However, Mr. Fitzgerald asked me here one day to stipulate that the testimony was correct. Of course we do not make any such stipulation, unless it applies to all of the testimony that is read.

By Judge BOURQUIN.—I understood the stipulation was, that any testimony read from the record that Mr. Noble, if called, would testify that he took it down and that it was correct.

By the EXAMINER.—That is correct.

By Judge BOURQUIN.—Of course we reserved the right, if we wanted, to put our witness on to say it was not correct,—if we wanted to, we could do so.

By General NOLAN.—There are palpable errors all through this testimony. I have read it myself,—palpably wrong, but I don't know as they are of any particular materiality. However, as the testimony is being read, Mr. Mason, if there is any portion of it that, as it seems to you from your standpoint, is incorrect, you can so declare. Otherwise, this testimony will be going in as the testimony you gave. If there is any mistake, then you can speak of it, and then, of course, Mr. Noble can come here. Of course if there is not any palpably material mistake, there is not any use in interrupting the proceedings.

[774] “LOUIS MASON, one of the defendants, being duly sworn in his own behalf, testified as follows:

Direct Examination.

(By Mr. MACKEL.)

Q. What is your name? A. Louis Mason.

(Testimony of Louis Mason.)

Q. You are one of the defendants in this case?

A. Yes, sir.

Q. You have heard the description given by the witness Mr. Knight as the location of the Butte & Boston placer claim? A. Yes, sir.

Q. And you know where these stones which marks this location are? A. Yes, sir.

Q. When did you first become familiar with this location?

A. Since 1890 or 1891, I should say.

Q. About what month in 1891? A. In April.

Q. The month of April, 1891? A. Yes, sir.

Q. Now, do you know anything about a quartz lode location having been made known as the Pleasant View? A. Yes, sir.

Q. When, if ever, did you work upon any of this ground?

A. In April, 1891, and at various times afterwards.

Q. Now, what was your interest in that ground?

A. I purchased an interest after the Pleasant view quartz location was made.

Q. Do you know what ground was covered by the Pleasant View location? A. Yes.

Q. Now, what claim is immediately south of the Butte & Boston claim?

A. Immediately south is the Bullwhacker quartz lode claim.

Q. What claim did you say was immediately south of the Pleasant View quartz location?

A. The Bullwhacker.

Q. Now, do you know of your [775] own knowl-

(Testimony of Louis Mason.)

edge that the Pleasant View quartz lode location was entirely within the bounds of the Butte & Boston location?

A. I do know that it was within the limits and bounds of the Butte & Boston placer location.

Q. And do you know whether this is a correct (showing witness map) map showing the location of the Pleasant View quartz lode claim?

A. I think it is by my knowledge of the survey.

Q. You did not make that map, Mr. Mason?

A. No, sir, I did not.

Q. You are not a surveyor by occupation?

A. No, sir, I am not.

Q. Who did make that map?

A. I think it was Mr. Frank, the gentleman who surveyed the claim last summer. I assisted him and know the corners.

Q. And all you know about it is what others have told you?

A. I know by myself setting these corners of the adjoining ground once myself, and I have assisted the surveyors to survey it two different times.

Q. Did you chain the survey of the Pleasant View location? A. Yes, sir.

Q. And you know from your own knowledge the corners of the Pleasant View location?

A. Yes, I do.

Q. You know from your own knowledge the surrounding corners of that ground? A. I do.

By Mr. MACKEL.—Now, the lines that are indicated here, you may point out to the Court on the

(Testimony of Louis Mason.)

plat, as now held, in the direction the claim lies.

A. The Bullwhacker lode is on the south side.

Q. And where is the Butte & Boston placer claim with reference to the Bullwhacker?

A. Immediately north of the Bullwhacker [776] lode, and extends a little west, about 180 feet, to about 120 or 30 feet east; I never helped chain this point up there.

Q. What do these heavy white lines indicate?

A. This line here at this point, and up to this point, is the outside boundary line of the Butte & Boston placer.

Q. And what does this red line indicate?

A. That is the Pleasant View quartz lode location made April 1st, 1890.

Q. Now, is that Pleasant View entirely within the bounds of the Butte & Boston location?

A. Yes, with the exception of a little point here that projects out on the Copper Queen lode.

Q. Which corner of the Pleasant View?

A. That is the northeast corner.

Q. Now, will you show us the lines of the Pleasant View quartz lode location as they were made at that time? A. Yes.

Q. Now, was there a discovery shaft upon the Pleasant View quartz lode mining claim?

A. There was, down about this point (indicating), down here somewhere.

Q. When, about, did you acquire an interest in the Pleasant View quartz claim?

A. I think on or about the 16th day of April, 1891;

(Testimony of Louis Mason.)

I think the deed is dated and is in escrow.

Q. And that was prior to the time that they had made their application for a placer patent on this claim? A. Yes, sir.

Q. And after they had made their application, did you sink another shaft upon the Pleasant View claim?

A. Yes, sir, I sunk three right along there, and one right up here, and one up close to the line, and another one probably 75 feet below, and [777] then I sunk one over here, prior to the application.

Q. Now where was that shaft?

A. It was about 160 feet north from the north line of the Bullwhacker lode.

Q. And how far west from the east line of the Pleasant View quartz lode location?

A. Well, I should judge between 50 and 75 feet, something like that, I never measured it.

Q. Did you sink these shafts yourself?

A. Yes, sir, with the aid of hired help.

Q. And did you sink the other ones before they had made their application, before Kemper had made his application for the placer patent?

A. Yes, sir, I did.

Q. What have you to say with reference to the discovery of the vein or lead at the bottom of the shaft?

A. There was.

Q. I will then ask you with reference to the original discovery shaft.

A. The original discovery shaft was caved in to some extent at the time I was on the ground, and

(Testimony of Louis Mason.)

afterwards we cleaned it out, and then I think we started in on the discovery shaft and found quartz on the north side and going out of the shaft probably a foot or such a matter.

Q. How long have you been engaged in mining?

A. Well, more or less for the last 13 years.

Q. Now was the ore you discovered there what is known as paying ore?

A. Well, it was very good quartz; I don't remember that I took any assay of that at the bottom.

Q. And what have you to say with reference to there being down there a well-defined ore body?

A. There was a defined lead south, of course on the north it was projected out [778] on the bank.

Q. At the time you went out there, was this prior to Mr. Kemper's application for a patent, you made this discovery?"

By the WITNESS.—Excuse me. You read south at the bottom of the Pleasant View shaft?

Q. Yes.

A. Well, south would be wrong, as I testified immediately following and knew the quartz was on the north side of this shaft.

“A. This discovery was made in 1890.

Q. About a year then prior to the application for patent? A. Yes.

Q. Was the discovery made before their placer location?

A. Yes, sir; their placer location was made soon afterwards. Their placer location was made on De-

(Testimony of Louis Mason.)

cember 20, 1890, and I cleaned the shaft out afterwards.

Q. Did you make an examination of the bottom of that shaft before they made their application for the placer patent?

A. No, I didn't; the shaft location was made by Charles Passmore and L. J. Hamilton.

Q. You say you did examine that shaft before they made their placer application.

A. No, I don't think it was before they made their placer application that we cleaned the shaft out.

Q. Did you sink any other shaft down there?

A. Yes.

Q. Upon this claim? A. I did.

Q. Where did you sink that?

A. The first shafts that I sunk was on the upper end of the ground, and later on, prior to the time that suit was started, I sunk shafts on the lower portion [779] of the ground.

Q. About how many shafts did you say you sunk on the lower portion of the ground?

A. Four, I think.

Q. And what did you discover in those shafts?

A. Well, I only sunk them to about a depth of 15 or 18 feet, and it seemed that I would find quite a good deal of float and solid lead, and some ore, some very good ore.

Q. Did you sink this shaft before they made their application for a placer title?

A. No, sir, not in the lower portions, I did not.

Q. Did you discover any of this vein—any of this

(Testimony of Louis Mason.)

portion of that vein before they made their application for a placer title?

A. Well, I sunk three shafts to a depth of from eight to ten feet in April, and about the first of May, on the north side."

By the WITNESS.—I sunk three shafts on the north side, it reads, does it?

Q. Yes.

A. It reads there, from eight to ten feet?

Q. Yes.

A. Those two shafts, No. 1 and 2, had never been disturbed until last,—until I think it was November, 1911, last year. I cleaned them out and they was of a depth of about twelve or thirteen feet. There was an old shovel remaining in the bottom of each shaft there that I left in 1891.

Q. You mean that after you cleaned them out, they had a depth of twelve feet?

A. Yes, sir, I didn't measure them when I sunk them and I did not measure them myself this time, when I cleaned them [780] out, but I judged by a ladder that I had—

Q. But when you testified in 1901, you judged the depths to be from eight to ten feet?

A. Yes, sir, they was full at that time and I could not measure them, and I did not have the measurements of them when I sunk them.

Q. When you cleaned them out, did you sink them any deeper?

A. No, sir, I did not. Mr. Kemper had men employed, they told me, and sunk them deeper in 1911.

(Testimony of Louis Mason.)

Q. When you cleaned them out you did not measure the depth, you simply guessed at the depth?

A. By a ladder,—I could judge very closely.

“Q. Of what year?

A. 1891. On the north side near the south end line of the Copper Queen and within the boundary lines of the Butte & Boston placer location, and within the boundary lines of the Pleasant View, and then later on I went over here (indicating) about 180 feet.

Q. Now, was that before their application?

A. That was prior to May 11th. About 160 or 80 feet north from the north line of the Bullwhacker, and within the limits of the Pleasant View, and there I sunk a shaft about 30 feet, and at a depth of about 16 feet I struck an ore body and I sacked up four sacks of that ore. That was prior to May 11th, and I can establish that by witnesses that were working there. I made the discovery of a well-defined lead in these three shafts along here.

Q. You say you discovered a well-defined lead in all of these shafts.

[781] A. Yes, over within the limits of the Butte & Boston placer and within the limits of the Pleasant View quartz claim where I sunk the three shafts, one near the north side line, and discovered a well-defined lead there, one within 20 or 30 feet of the south end line of the Copper Queen, but within the limits of the Pleasant View and the Butte & Boston placer.

Q. Was there any other people who examined this ground, any witnesses you have in court here to-day,

(Testimony of Louis Mason.)

have these other people ever examined these shafts?

A. Yes, sir.

Q. Name some of them.

A. Mr. Dean and Mr. Noyles, and three parties from Indiana that worked there for a time prior to the application for this patent, they had come, one of them, prior to this application, and he went to his home, Indiana, but I have heard from him in regard to the matter.

Q. What did you say with reference to this being known to the community in general, that there was a well-defined lead or that there was quartz upon this claim?

A. Well, there are the people I have spoken about, people I have spoken to with reference to the discoveries at that time, and there were a good many people coming and going at various times, year after year, while I was working there.

Q. Now, you say that you took out some ore of some of these claims.

A. I took out some ore and [782] sacked it up there, four or five sacks of ore out of the shaft that is sunk about 160 or 70 feet north from the north line of the Bullwhacker and within the actual lines of the Pleasant View and Butte & Boston placer.

Q. You say that you cleaned out this original discovery shaft. A. Yes, sir.

Q. Did you sink it any deeper? A. I did not.

Q. From your investigations, could you tell whether or not that shaft has been sunk so as to expose this vein prior to the time you cleaned it out?

(Testimony of Louis Mason.)

A. Well, I judged from the vegetable matter and the black surface soil at that time that it was in there; when I got to the bottom you could handily distinguish it in cleaning it out.

Q. State whether or not you know that Mr. Kemper knew that this had been discovered, that is this discovery had been made prior to his application for a placer patent.

A. I am confident that he knew of these discoveries on the upper and prior to the application.

Q. Was the earth dug up so that anyone could see that shafts had been sunk there? A. Yes.

Q. What was the condition and appearance there with reference to shafts being sunk there in 1891?"

By the WITNESS.—Excuse me. At this point where it reads if Mr. Kemper knew that there was quartz there, I went,—it probably was the year or so after the time of the discovery [783] of this ore in the shaft known as the Hornet shaft, to pay Mr. Kemper, sitting there, some money that I owed him. He says, "Lou, you have got ore in there in that shaft and on that ground," but, he says, "I will beat you, just the same."

Q. Well, you were questioned about that on this same examination at another place.

A. In regard to that, no, sir,—not that I know of.

Q. And in that other place in your testimony, in relating that Mr. Kemper said, you did not say that he told you that you had ore.

A. I never was questioned about that.

Q. We will read and see if you did not, in con-

(Testimony of Louis Mason.)

versations that you had with Mr. Kemper.

A. Are you alluding to the testimony eleven years ago, or the testimony given at this time?

Q. The testimony given in 1901.

A. Oh, I thought you was meaning this testimony that I was questioned in regard to last there.

Q. Mr. Kemper did not say anything about ore that was in the wash, did he, above bedrock?

A. No, sir. It was after he had moved his office away from the office where Mr. Passmore was,—I think he was officing prior to that time with Mr. Passmore, if I am not mistaken.

Q. When was this alleged conversation that you are speaking about now?

A. I think it was a year or so afterwards.

Q. Well, you had opened some additional shafts in the meantime, had you not? A. Yes, I had.

“A. The work I did there was the only work done in that district except that large timbered shaft above [784] the line on the BIRTHA, and just east of this Butte & Boston placer.

Q. Now, what have you to say with reference to whether the assessment work had been done upon this Pleasant View quartz location, and for how long?

A. Well, the laws was fully complied with in regard to the amount of work to be done upon that ground until October, in the year 1895. It would not revert to the Government until the first of January, 1896.

Q. Who did the work? A. I did.

Q. You did the assessment work from the time you

(Testimony of Louis Mason.)

acquired the interest up to 1895? A. Yes, sir.

Q. And you know of your own knowledge that the assessment work during all that time was done?

A. Yes, sir.

Q. And it was later on, probably about 1895, that they obtained their placer title to that claim.

A. Yes, sir.

Q. Do you know whether or not the assessment work was done during the years, say 1896, '97 and '98, on the Pleasant View quartz lode location?

A. After the 25th day of March, 1895, or on the 25th day of March, and in 1895 and 1896 that ground was thoroughly represented for that location.

Q. That was not the Pleasant View location?

A. No, sir, it was the Lineor.

Q. In 1895? A. Yes.

Q. Was all the representation work done after the quartz lode location during the year 1898?

A. No, sir.

Q. Or 1899? A. No, sir.

Q. Now, what do you know about the Gold [785] quartz location?

A. It was made, I think, on the 7th or 9th of last May."

By the WITNESS.—What location?

Q. It is written here Gold, but that is probably the Gulf.

A. It is the Gulf. I don't know of any gold.

"Q. Of last May? A. Yes, sir.

Q. Now, do you know the boundaries of the Gulf lode location?

(Testimony of Louis Mason.)

A. Yes, it is bounded on the south by the Bullwhacker lode and on the west by the placer tract 888, is the number, I think, I don't remember the exact name of it, and on the eastern portion of it and a portion of the northeast, by the Copper Queen.

Q. And what have you to say with reference to it covering any other ground, and, if so, what portion of the ground which was originally covered by the Pleasant View quartz lode location?

A. It does not cover quite as much ground as the Pleasant View covered, but the lines of it is within the inside lines of the Pleasant View, and on the north side,—

Q. How about the south line of the Gulf lode?

A. The south line of the Gulf lode is bounded by the north line of the Bullwhacker.

Q. And it covers all of the southern portion of the ground which was originally covered by the Pleasant View location?

A. It does not cover quite all; it does not extend north quite as far, but the southern part is on the same line.

Q. Does it cover all of [786] that ground, of the Pleasant View location?

A. No, sir, the ground where the discovery shaft was sunk on the Pleasant View, where these three shafts were sunk on the Pleasant View,—

Q. What have you to say with reference to these shafts being within the bounds of the Gulf lode locations?

A. The work that I began in 1891, you mean?

(Testimony of Louis Mason.)

Q. No, the work that you were enjoined from doing in this case.

A. Oh, that work was within the limits of the Pleasant View Location.

Q. Was it also within the limits of the Gulf lode location?

A. I think it is; of course, we have not surveyed the tunnel, and I cannot say whether a portion of the tunnel is beyond the shafts here some distance."

By the WITNESS.—Those shafts you are alluding to there are the shafts you stated,—the way the question reads would be including that as work done in 1901, wouldn't it,—doesn't it?

Q. No, the question just preceding says, "No, the work that you were enjoined from doing in this case."

A. The tunnel in the Gulf shaft was work done under those new locations, but the Hornet shaft and the shaft a short distance southwest, and another one about eighty or a hundred feet northwest, was work done in 1891, and they would be included in the way that answer reads there.

"A. (Cont.) I don't know whether a portion of the tunnel has passed the end lines or not.

Q. In the [787] answer it is set up here that there was the Rabbit location and the Olivia location, the Hope location and the Gulf location. Which of these locations extends farthest east?

A. The Hope extends farthest east.

Q. Are you sure that the shafts that you have sunk, and upon which you were working at the time you were enjoined in this case, was within the bounds of

(Testimony of Louis Mason.)

the Hope location?

A. They are within the lines of the Hope.

Q. And the shaft you sunk is within the grounds that were originally covered by the Pleasant View quartz lode location. A. Yes.

Q. Do you know anything about the discovery shaft which was sunk upon the Golf lode location and declaratory statement is made? A. I do.

Q. What have you to say with reference to there being any other work that was done other than the sinking of that shaft?

A. About 160 feet north from the north side line of the Bullwhacker lode, and about 180 feet, maybe 200, west from the Bertha side line, that is on a line running east and west, and take it on a line north of east it would probably be 160 feet,—

Q. What have you to say with reference to the discovery of quartz within that shaft?

A. We discovered a very well defined wall and lead, and very good ore there.

Q. You did not sign the location, but you helped to do the work? A. Yes, sir.

Q. Helped sink the shaft? A. Yes.

[788] Q. And you know of your own knowledge that there was quartz in this shaft? A. Yes, sir.

Q. Now, did you help fix the boundaries of this claim?

A. I did, helped put up the posts.

Q. And you know where the posts were and the lines in order to fill out that location? A. Yes, sir.

Q. And do you know that this ground was all

(Testimony of Louis Mason.)

within that original Pleasant View location?

A. Yes; it might have been over a little on one point to avoid a conflict on the southeast corner, but on the north side it is within the limits of the old Pleasant View, probably 75 or 100 feet at the south line of the Gold claim adjoining the Bullwhacker claim.

Q. Did the south line of the Golf claim join the Bullwhacker claim? A. Yes, sir.

Q. How far did it follow and join the Bullwhacker claim?

A. About 1320 feet, or probably 40, and if I am not mistaken it is 180 feet west from the northwest corner of the Bullwhacker claim.

Q. Now, you may state whether at any one of these corners,— Follow it all the way around and show whether there are posts there or not.

A. We had, about 180 feet from the one due west from the southwest corner of the Bullwhacker, there is a post set, I think six by six; then you run north, or in a northerly direction, about 600 feet and there is another post up, about six by six; then the north side line runs in an easterly direction 1500 feet, and [789] there you find another post of about the same size; then you turn and go south about 600 feet, to a line running east from the northeast corner of the Bullwhacker claim, and is also the south side line of the Butte & Boston placer, and there you find another post of about the same size; then you turn and go in a westerly direction probably about 1500 feet until you come to the southwest corner of the Golf, which

(Testimony of Louis Mason.)

is about 160 feet or 80 feet west of the northwest corner of the Bullwhacker claim.

Q. How deep was this shaft sunk?

A. About 22 feet.

Q. And that was prior to the filing of this declaration? A. Yes, sir.

By Mr. MACKEL.—We now again offer this page 324 of Book H, Quartz Lode Locations, in evidence.

By Mr. McBRIDE.—We renew our objection at this time, but will submit it without argument.

By the COURT.—It will be admitted for the present, subject to the further order of the Court.

Cross-examination.

(By Mr. McBRIDE.)

Q. I understood you to say that your first acquaintance with the Pleasant View ground was April 16th, 1891.

A. On or about that time I obtained an interest in the ground.

Q. Did you get a deed for it at that time?

A. There is a deed here; it will show for itself.

Q. And afterwards [790] delivered?

A. Yes.

Q. About the year 1895?

A. No, sir, delivered in 1891.

Q. Now, how long before April 16th were you acquainted with this ground?

A. I began work, I think, three or four days after the 16th of April, 1891.

Q. And that was your first acquaintance with the ground?

(Testimony of Louis Mason.)

A. Oh, I had been over the ground at different times prior to getting an interest in the ground.

Q. Well, you began work on it about the 16th of April, 1891?

A. Well, shortly after the 16th, I think; I haven't a memorandum of the dates when I commenced.

Q. And what character of work were you doing, representation work? A. Sinking shafts.

Q. For the purpose of representing it?

A. Yes, sir.

Q. Now, at that time, were you acquainted with the discovery shaft, the shaft you have referred to as the discovery shaft of the Pleasant View lode claim, you know where that shaft was at that time?

A. Yes, sir.

Q. Have you got your map with you which you had this morning? A. Yes, it is lying there.

Q. Now, can you state to the Court where that discovery shaft is on that map?

A. The discovery shaft is somewhere about here (indicating), down about that portion of the ground, I should judge, I never measured the course to know just how far it is and how far from the old end line, but I would judge it is somewhere near here (indicating).

Q. Then it would be somewhere about 250 feet from the south side line. I wish you would mark a dot where that discovery shaft was.

[791] (Witness marks on plat location of discovery shaft.)

A. As near as I could judge it, without measuring,

(Testimony of Louis Mason.)

it is about here (indicating), it would be somewhere about there where I marked the letter D.

Q. And that is about 250 feet north of the Bullwhacker lode claim?

A. Yes, 250 or 300, I don't know by actual measurement.

Q. And about 600 feet east?

A. Yes, I should judge it is.

Q. Of the west end line of the claim?

A. Yes, I judge it is.

Q. Then it is about the middle, as far as east and west is concerned?

A. Pretty close to the middle, maybe a little below the middle. There is a shaft about 35 feet, maybe 50 feet, west; that is the shaft that Mr. Kemper sunk; that shaft I will mark K for Kemper shaft.

Q. Was that shaft there in the month of April, 1891?

A. It was there, if I am not mistaken it was there, but I think it was sunk deeper later on.

Q. Well, how deep was it in 1891?

A. I don't remember.

Q. How deep was the discovery shaft in 1891?

A. It was filled up some at that time, but I should judge about 20 feet deep.

Q. How much filling was there in it?

A. Oh, I can't say as to that.

Q. But it was 20 feet deep with the filling?

A. Yes.

Q. Was there another shaft there in April, 1891?

A. Not around there.

(Testimony of Louis Mason.)

Q. Where did you go to work?

A. I first started to work right along just about here (indicating), started first probably between 50 and 75 feet, something like that, from this [792] line over here, from the northeast line of the Butte & Boston placer and the south end line of the Copper Queen.

Q. Now, mark that shaft No. 1?

(Witness marks shaft No. 1.)

A. I sunk down there probably 10 feet, and I discovered a lead, and then I went probably 50 feet—

Q. This shaft is over here somewhere (indicating)?

A. Yes, sir.

Q. And how deep did you sink it?

A. About 10 or 12 feet; I sunk that on or about the 18th or 20th of April, 1891.

Q. 10 or 12 feet of a depth?

A. Yes, sir.

Q. Is there anything on that map,—or in the immediate vicinity of that shaft by which you could identify it?

A. Well, there is the bounded corners here of the Copper Queen, somewhere about here (indicating), and there is another bounded corner of the Copper Queen marked about there (indicating).

Q. What is the nature of the surface of that country?

A. Oh, the surface of the country is pretty level. It has a gradual incline. You can drive up with a wagon or buggy, but when you get up here (indicating) it begins to rise faster.

(Testimony of Louis Mason.)

Q. Did anybody help you in sinking this shaft No. #? A. Yes.

Q. Who was it?

A. Eli Ray and Grant Poor, and another party.

Q. And you were working at that time for yourself and for Mr. Passmore?

A. Myself and Mr. Passmore and others interested in the ground.

Q. That is you were in the employ of the owners?

A. Yes, sir.

Q. And that was representation [793] work?

A. Yes, sir.

Q. For what year?

A. Well, I was to do so much work for my interest in the ground.

Q. Was this intended for the representation work for 1891? A. Yes, sir.

Q. Then this shaft No. 1 was a part of the representation work for 1891?

A. Of course, it was considered as representation work.

Q. What other work did you do?

A. After that I came up here (indicating), and I followed that lead here, this is the lead (indicating), a distance of 60 or 75 feet, and then I sunk again on the same line.

Q. What is this here (indicating)?

A. That is a discovery shaft.

Q. Is that where you sunk the second discovery shaft?

A. No, sir, that is out here (indicating); I will

(Testimony of Louis Mason.)

mark it No. 2, and which is about 20 feet east of the Olivia Discovery shaft, and is from 8 to 10 feet deep.

Q. You are sure it was not deeper than that?

A. Oh, it might be a little deeper, but something in the neighborhood of 8 or 10 feet; I do not remember; that as near as I do remember.

Q. These two gentlemen also helped you sink the No. 2 shaft. A. Yes.

Q. And it was done for the purpose of representing the ground?

A. Yes, and for the purpose of getting my interest in the ground.

Q. Did you find a lead in No. 2 shaft? A. Yes.

Q. You found a lead in No. 1? A. Yes, sir.

Q. And state whether or not at the time you found it you informed Mr. Passmore and Mr. Hamilton of the fact that you had found a lead.

A. Yes, sir, and Mr. Passmore came and examined [794] it.

Q. Did anybody else examine it?

A. My brother was there and Mr. Dean was out there, and other parties when I completed the shaft.

Q. When did you complete the shaft?

A. And then I followed up, I forget just whether it was just below where I sunk the third one down or not, but I should say it was a short distance above here, I think about a hundred feet, somewhere about here (indicating) the No. 3, and then I sunk, by mistake over on this other claim.

Q. Is No. 3 over on the other claim?

A. No, I don't think it is; I found a lead out here,

(Testimony of Louis Mason.)

also, but that was over on other ground.

Q. That was shaft No. 4?

A. Yes, that was on the Copper Queen.

Q. Put a mark where you sunk No. 4 shaft.

(Witness making figure 4 where shaft No. 4 was sunk.)

Q. How deep was that?

A. I don't know, I don't remember, it was over ten feet, say 8 to 12 feet down, it was not over 12.

Q. You also notified Mr. Passmore and Mr. Hamilton of what you found there?

A. Yes, and Mr. Passmore examined it.

Q. Are those shafts all in the same condition that they were then? A. Yes, sir.

Q. Have they changed any?

A. No, sir, no work has been done, they have filled up some is the only change, filled up quite a bit, and this was excavated.

Q. Where was the next?

A. I came over this way (indicating), here, and went to work.

Q. Now, where is that?

A. That is about 160 or 70 feet, something like that, from the north line of the Bullwhacker claim.

Q. How far [795] was it from the shaft marked here Hornet Discovery?

A. Well, that is the shaft itself.

Q. You will mark that No. 5?

A. Yes, I will mark it No. 5.

Q. And what did you do there?

A. I sunk that shaft down to about 29 or 30 feet;

(Testimony of Louis Mason.)

there was a windlass on it.

Q. Who assisted in that?

A. Grant Poor and Eli Ray. That was done between the 1st of May and the 10th of May, one of the parties that was working for me there, I paid him off, and I think it was on the 12th, and he went back east.

Q. Then you were still working for Mr. Passmore and Hamilton? A. For my interest, yes, sir.

Q. You have not actually bought in?

A. No, sir.

Q. And where was the next shaft you sunk?

A. I sunk then down below, out here (indicating) somewhere, about 10 or 12 feet probably.

Q. And how far distant from the point of discovery? A. About 120 feet probably.

Q. 120 feet west? A. Yes, sir, west.

Q. How deep did you sink there?

A. 10 or 12 feet.

Q. Now mark that No. 6 where you sunk your last shaft.

(Witness marks figure 6 where last shaft was sunk.)

A. I sunk it down there 10 or 12 feet.

Q. And what date? A. In May, 1891.

Q. You began that about May 11th or 12th?

A. No, I think about the 10th.

Q. About the 10th of May you commenced?

A. Yes.

Q. That is No. 6? A. Yes.

Q. And you sunk that about 8 or 10 feet?

A. Something like that.

(Testimony of Louis Mason.)

Q. At that time you had no lead in that shaft?

A. Yes, I had a lead; I can show you the lead.

Q. And you also had a lead in shaft [796] No. 5? A. Yes.

Q. And you showed them both to Mr. Hamilton and Passmore? A. Yes, and Mr. Kemper also.

Q. In May, 1891, when you sunk it?

A. Yes, and I had four sacks of ore sacked up when Mr. Kemper came out there, and the shaft was cleaned out the last of May and ore was taken out again, and I was back down the shaft, and I threw it back myself.

Q. Did you sink in solid granite or wash?

A. There was about 6 feet of wash in some places; it was thin in some places and deeper in others; it is deeper in one place than another. The ground has little ravines, and the wash of that will naturally fill up very fast. In various places where I have sunk I have found that to be the case.

Q. What was the occasion of calling Mr. Kemper's attention to it?

A. I didn't call his attention to it; he was there and looked at it; he came there, he and another gentleman in a buggy. I was not here personally at the time they came there, but my partner and a man that was working for me told me that they came.

Q. Well, now, what do you know of Mr. Kemper coming out there and looking at that shaft, of your own knowledge?

A. Not of my own knowledge, I was not there at the time he came.

(Testimony of Louis Mason.)

Q. What do you know of your own knowledge of you showing Mr. Kemper some ore in 1891?

A. I said that I showed him some ore.

Q. What do you say about showing him some ore, what were the facts in relation to that.

A. I do not know of my own knowledge [797] of his going there, only through the parties I had employed; they told me of his being there.

Q. You were asked about your showing Mr. Kemper any ore that you took out of that shaft No. 5?

A. From my own knowledge I didn't show him the ore, that is myself personally.

Q. Did you ever at any time have any conversation with Mr. Kemper specifically relative to any ore taken out of that shaft?

A. I don't remember whether I had or not.

Q. Now, what other work was done on that ground at that time when you concluded the sinking of shaft No. 6? A. I sunk in various places.

Q. Well, what other work was done at that time?

A. Oh, there was no other work on this ground, not this portion of it, and no shaft sunk at that time except what I sunk myself.

Q. Then these shafts that you have here, the discovery shafts, 1, 2, 3, 4, 5 and 6, were all the shafts there put down there on that ground prior to May, 1896?

A. Yes, Mr. Kemper had a shaft down somewhere about here (indicating), and also had a shaft or sunk a shaft I don't know whether it was considered within

(Testimony of Louis Mason.)

what it,—I don't think,—it was down about here (indicating).

Q. Now, mark it K No. 2.

(Witness marks shaft k No. 2.)

A. It was somewhere in this vicinity, that shows for itself.

Q. Now, mark the other shaft k-3.

(Witness marks shaft k-3.)

A. That was pretty close to the bounded corner of the Bullwhacker claim, that is probably, I would say, 30 or [798] 40 feet from this corner out to that shaft.

Q. Have you given us all the openings that there were on this ground in existence, I am asking you about the Pleasant View? A. Yes, sir.

Q. Did you hear Mr. McKnight give the boundaries of the Butte & Boston Placer? State whether or not there were any openings made by the Butte & Boston placer people outside of the one you have mentioned.

A. I don't think there were any, that is above the main shaft, to my knowledge, the Kemper discovery shaft, which is probably 20 feet above and is a timbered shaft; that was my understanding, he in fact told me himself.

Q. Have you got everything now that there was on that ground at that time?

A. In regard to that shaft there, that timbered shaft of Mr. Kemper's, that he worked in some time afterward to the depth of,—he worked there, I don't remember exactly how deep.

(Testimony of Louis Mason.)

Q. I want you to locate every shaft that there was there on that ground prior to May, 1891?

A. That was all there was there at that time.

Q. These were all the shafts that you know anything about prior to that time?

A. I think that was all there was there.

Q. You are the Mr. Mason that afterwards made a deed to Mr. Kemper for the Butte & Boston ground?

A. Yes, sir.

Q. Was there anybody else working on that ground at the time you were doing the work there?

A. Working within the limits of the Butte & Boston placer?

Q. Yes, sir.

A. I [799] don't think there was, I don't remember of it.

Q. Mr. Kemper was not carrying on any work at the time you were doing the work on that east end?

A. I don't think he was; no, sir; he came up there along about the time that the work was done on the discovery, a Mr. Forbis was there with him, one night, but at that time he was not working there, to the best of my knowledge.

Q. Is it not a fact, Mr. Mason, that instead of calling Mr. Kemper's attention to any sacks of ore which you had taken out of the shaft which you have designated as No. 5, known as the Hornet Discovery, in 1891, that at the time you sold to Mr. Kemper in the year 1897, you told him that in the year 1895 you had taken some ore out of this shaft?

A. That I told him in 1895 I took ore out of that

(Testimony of Louis Mason.)

shaft? No, sir, I did not. I told him I found ore in the bottom of the shaft which I sunk to a depth of about 48 feet on the north side and about 12 feet from the east end line of the Copper Queen.

Q. What did you say, referring to that timbered shaft?

A. It is a shaft timbered in the clear four by eight.

Q. Is it one of the Kemper shafts?

A. No, sir, one I sunk in partnership with Mrs. Hopkins when we had a lead and bond.

Q. Will you designate the shaft you refer to as the timbered shaft on this map?

A. It is not marked.

Q. No, you put down 'Timber' for it?

A. It is right about here, close to the line.

(Witness marks timbered shaft.)

Q. And you secured that for whom?

A. For myself [800] and Mrs. Hopkins, got a bond on Mr. Mullin's interest and Mr. Hamilton's and sunk that shaft.

Q. When was that shaft sunk?

A. In 1895, that is to the best of my memory. I have some memoranda of supplies that I purchased at that time.

Q. Have you sunk any shafts on that ground since 1891?

A. Yes, I have sunk in a number of places since 1891.

Q. Can you mark them or designate them in rotation?

A. It would be a little difficult for me to make them

(Testimony of Louis Mason.)

in rotation now, I think I can go and take a survey and get them all in rotation.

Q. You have got shafts 5, 6 and 7. You might mark the timbered shaft No. 8.

A. I think that it would be a little difficult for me to give you a definite idea in regard to all of them without taking some measurements and getting this all arranged as they are on the ground.

Q. Well, where do you think you sunk the next shaft?

A. Well, there is one sunk down here somewhere (indicating), to a depth of about 16 or 20 feet, something like that.

Q. Will you mark that?

A. It was sunk in the latter part of 1891.

Q. Will you mark it?

(Witness designates on map location of shaft.)

A. It is somewhere about here; I will mark it 6. I would not give you any definite measurements of the various points, but I can go and take a survey and get it exactly.

Q. That was sunk in the latter part of 1891 or 92?

A. Yes, sir.

Q. And it was sunk under your contract to do the representation work? A. Yes, sir.

[801] Q. And how deep is that shaft sunk?

A. About 16 or 20 feet.

Q. What other shafts did you sink after that?

A. I sunk one over here a little west of Mr. Kemper's shaft.

(Testimony of Louis Mason.)

Q. And mark that 9.

(Witness marks shaft last referred to, 9.)

A. Of course, that was all subject to variation by measurements and surveys, the correct distances.

Q. And that was sunk under your agreement with Passmore and Hamilton to do work on this claim?

A. Yes, sir.

Q. How deep was that shaft sunk?

A. I don't remember, but I believe about 20 feet.

Q. And that shaft was on the other claim?

A. This is the point specified.

Q. Was that shaft sunk in 1892 or 3?

A. I think 1892.

Q. And when was the next shaft sunk?

A. I sunk this one here (indicating); that I designate as below here (indicating), down to about 30 feet, in 1893, to a total depth of 30 feet in 1893, and then I sunk another one somewhere close in about a year.

Q. Well, mark that one 10.

(Witness marks shaft No. 10 on map.)

Q. When was that sunk?

A. That was in 1894, if I am not mistaken.

Q. How deep was that sunk?

A. About 29 feet. Then there is another shaft out here (indicating), that is down about 10 or 12 feet.

Q. Well, we will designate that one as 11. When was that sunk?

A. I don't remember whether I sunk that one in 1892 or 3; there was no windlass on it, I remember that.

(Testimony of Louis Mason.)

Q. Where is the next shaft, the next work?

A. Well, I sunk one by mistake over by the side of this little one [802] out here on other ground.

Q. Well, mark that one 12.

A. It would be somewhere in this vicinity here (indicating).

Q. When was that sunk? A. 1893.

Q. And the next one that you sunk is where?

A. That is somewhere near about this line here (indicating).

Q. Now, will you mark that one 13? When was that sunk? A. In 1894.

Q. And how deep was it sunk?

A. About 15 or 30 feet.

Q. You are still in the employ of Passmore and Hamilton?

A. Yes, my agreement was to do so much work to obtain a patent on the two claims.

Q. Now, after that, what did you do next?

A. Well, I don't remember now whether I worked any more after that or not. I didn't work any in 1895, to the best of my knowledge.

Q. Did you work any in 1896?

A. Yes, on this quartz location. I worked in 1895 under the lease and bond from the other parties and also—

Q. This lease and bond you speak of, you took from whom? A. Mr. Mullins and Mr. Hamilton.

Q. Where did you do this work under this lease and bond?

A. In this shaft that was timbered, and also on an-

(Testimony of Louis Mason.)

other shaft down here somewhere (indicating).

Q. Well, mark that 14.

A. That shaft is the one that is timbered, and it is about 6 feet wide, I should judge, and about 8 long; it is a large opening there, and timbered.

Q. Well, mark it 14.

(Witness marking it 14.)

Q. Now, was there ever any other work done there under that lease and bond?

A. There was a small pit sunk below this timbered shaft about 7 feet deep.

Q. Mark [803] that 15.

(Witness marking it 15.)

Q. Now, was there any other work done under that lease and bond? A. No, sir.

Q. What year was that lease and bond taken in?

A. In 1895; this shaft that we sunk and timbered up here was a shaft that had been worked on two different times before; I first sunk it about 10 feet in April, 1891, and in 1895 we sunk it down to a depth of 30 feet, and then following after the settlement of the ground, Mrs. Hopkins and I bonded Mr. Mullins' interest and Mr. Hamilton's interest, and sunk the shaft to a depth of about 48 feet.

Q. And that is all the work that was done in the year 1895?

A. I think it is, there may be other small shafts, I don't remember about any others.

Q. Was there ever any work done on the ground since 1895 until the present work that is being done now by you and your associates?

(Testimony of Louis Mason.)

A. I don't think there has, no, sir; I have been over there every year, and I don't think there has; there was some parties last winter dug a shaft about 4 feet square, about 20 feet south of west from this timbered shaft, and then they sunk another little shaft.

Q. That was done last winter? A. Yes, sir.

Q. And that can be very easily distinguished from your workings? A. Yes, sir.

Q. Now mark that 'N.'

(Witness marking that shaft 'N.')

A. I don't know who done that work, and don't know exactly when it was done,—

Q. It is about 20 feet south of west from the timbered shaft. Just mark where it is.

A. It is right about at [804] this point here somewhere.

(Witness indicating on map location of last work with the letter N-12).

Now, you will find, also, that there is a little cut over right near the line, I am not certain whether it is on this ground or not, but it is right close to the line down here, done last winter.

Q. You might mark that N-2.

A. I will mark it right on the line, to the best of my judgment it is right on the line.

Q. Now, is there anything else on that ground?

A. I don't think there is; well, there might be some places where I have worked myself, as I say, I don't remember exactly; I can go and show a man every place I have worked from the beginning to the pres-

(Testimony of Louis Mason.)

ent time; there may be work that I have done that I have not mapped out; I will state that the map is subject to changes, by measurement.

Case continued to the 4th day of March, 1901, at 10 A. M.

LEWIS MASON, one of the defendants, recalled for further direct examination by Mr. CONNOLLY:

Q. You were sworn before in this case?

A. Yes.

Q. Were you present when Mr. Pennington took his field notes for the survey of this ground out there on the 5th day of March? A. I was, yes.

Q. And did you assist him in locating [805] the shafts and in designating them on the map?

A. Yes, I showed him the different shafts and the places on this ground.

Q. You showed him everything? A. Yes.

Q. You testified before, I believe, designating those shafts on another small map? Is this map now correct according to your testimony given heretofore, or are there any variations?

A. I think we made this correct. In my testimony before, I said that it would be given subject to variations by survey and measurements, and these notes of the shafts on the ground, I think that is correct.

Q. Now, the shaft and openings that were sunk there are correctly designated on this map?

A. Yes, I think so.

Q. So far as the working and the openings are concerned and this survey?

(Testimony of Louis Mason.)

A. Yes, sir, with the exception of the Hope Discovery up here (indicating). I think it is further up than this. It is about 12 feet from the side lines of the Pleasant View.

Q. Well, the Hope Discovery designation was placed there by Mr. Merriman on this map?

A. Yes.

Q. And was not placed there by the surveyor?

A. No, sir.

Q. And you think that it is not exactly placed upon the map?

A. I don't think it was, quite.

Q. Now, what do you know about the Hornet shaft, or its original sinking?

A. If I am not mistaken, that shaft was begun about the 2d or 3d of May, 1891, and sunk to a depth of 30 feet.

Q. I will ask you what was the date you said that was located or sunk?

A. I think I began, as near as I can remember [806] about the 2d or 3d of May, 1891, to sink it.

Q. Now, the date of the application for a patent, do you recall that?

A. That was on the 11th.

Q. Then it would be 8 or 9 days prior to the application for a patent? A. Yes.

Q. And that was the shaft, if I understand it, about which there was some testimony on your part concerning Mr. Kemper—that he visited it when some sacks of ore were at the top there? A. Yes, sir.

Q. And if I understand your testimony, you did

(Testimony of Louis Mason.)

not pretend to know that he came there and saw that ore in the sacks, of your own knowledge, but that somebody who was working for you at the time was there, and who is now living in the State of Indiana.

A. I was not there personally when Mr. Kemper came there, but the boys whom I had working there were there.

Q. And do you know whether or not he was there, of your own knowledge?

A. No, sir, not of my own knowledge.

Q. Well, it would take about two days to sink to bedrock, or very near, and at bedrock it shows an ore lead, at the beginning of the bedrock, and it is there to be seen to-day, ore that will pay to ship.

Q. Now, you may state whether or not that was there at that time on the 2d or 3d of May, 1891, a well-defined vein of quartz?

A. I should consider it as well defined a vein as any one would wish to see near the surface—an average.

Q. Has that vein been disturbed in any way or worked since that time?

A. Well, I was out there yesterday.

Q. Well, I mean going back over the years [807] since then, generally, I mean, prior to the beginning of this action?

A. I don't think so. You say from the beginning of this action. This shaft was cleaned out; it was filled up some, and it was cleaned out some last summer; I cleaned it, a portion of it, and Mr. Kift and

(Testimony of Louis Mason.)

Mr. Noyles, the gentleman who made the Hornet location.

Q. By the way, have you any interest in the Hornet location at this time?

A. I have, yes, an interest.

Q. What interest have you in it, Mr. Mason, in the Hornet discovery? A. A $\frac{1}{8}$ interest.

Q. What kind of an interest is it?

A. Well, it is a bonded interest.

Q. You have a bond on that property?

A. Yes.

Q. And in connection with whom?

A. With Mr. Merriman.

Q. From whom,—Mr. Kift and Mr. Noyles, the owners of the Hornet? A. Yes.

Q. Did you see the Hornet shaft frequently, or at all, subsequent to the location of that shaft and the sinking of the shaft?

A. Well, I have been on the ground out there at different times every year since I obtained the interest from Mr. Passmore and Mr. Hamilton, with the exception of the year 1898; I don't remember about that year.

Q. What was the condition in 1895, if you recollect, in relation to what it was in 1891, when it was discovered?

A. Well, in 1895 it had filled up partially, 10 feet, something like that.

Q. State whether or not in 1895 there was a part of a vein exposed there?

A. Yes, there was ore in place exposed in 1895.

(Testimony of Louis Mason.)

Q. In the same place?

A. Yes, I think [808] it was still above the fill. I didn't go down in the shaft, but I judged from the top of the shaft that it was in sight; that it was still uncovered by the fill.

Q. Was it more, or less, conspicuous and in its place in 1895?

A. It was hardly dug in 1891, and it was fresh, and it would show better then than it would in 1895.

Q. Was there any work done in that shaft during these years? A. Not in that shaft.

Q. In 1891 what was that located as, that ground, that this particular shaft is on?

A. This particular shaft was not a discovery shaft, but is where you would post a notice. We did not post a notice there; there was a discovery made on the Pleasant View ground.

Q. Who sunk that?

A. Myself, together with some hired help.

Q. And as what?

A. As representing my interest in the ground under a contract on the Pleasant View and Point Pleasant.

Q. The Pleasant View is the location that has heretofore been referred to today?

A. Yes, and been specified as another quartz location. There is another quartz location made directly north of the Pleasant View and lapping over a portion of the Pleasant View, the Copper Queen on the north.

Q. Then do you know to what depth that shaft

(Testimony of Louis Mason.)

was sunk in 1891?

A. I stated some time ago that it was sunk to a depth of 30 feet, if I am not mistaken. Q. Did you say what the depth was when the survey was had, a few days ago?

A. Well, it was not cleaned out to the bottom; there is quite a bit of fill, and there was a little drift or [809] opening made, probably 2 feet wide on the east side of the shaft, on ore. Then the bottom of this little opening made on the west—2 feet, I should say—and on the east side of the shaft toward the mountain, I should call that black dirt or wash.

Q. Now, where was the indication of a vein?

A. The vein shows on the north side of the shaft and down on the east side, too, probably 6 or 8 feet from the bottom.

Q. And on the east side?

A. It shows on the east, across the full side.

Q. Then the east side is the side toward the foot-hills? A. Yes, sir.

Q. Is there any showing of the vein or vein matter on the south or west side; south toward Columbia Gardens or the car tracks, or west toward the town?

A. Well, it is more or less mineralized, but it does not show so much on the south side as it does on the north.

Q. How wide was that shaft at that time?

A. About 3 feet square when I first sunk it.

Q. Did ever anybody else know of the existence

(Testimony of Louis Mason.)

of that vein matter or vein there at the bottom of that shaft?

A. Well, Mr. Jones, a gentleman living in Indiana, and Mr. Smith who lives in Indiana, and Levi Ray, who lives in — County, Indiana, and P. O. Dean, that lives in Butte, and H. J. Mason, my brother, who lives in Butte, and a gentleman by the name of Noyles, and a number of others that I can mention if necessary.

Q. Mr. Jones, Mr. Ray, Mr. Smith, you say, live in Indiana now? A. Yes.

Q. Were they residents of this county at that time?

A. I cannot [810] say whether they had lived here long enough to become voters or not. I don't remember how long they had been here previous. They had been here, though, prior to the time they did the work for me.

Q. Do you know if they knew of the existence of quartz upon that ground prior to the application for a patent, or prior to the 11th day of May?

A. I am confident that they knew it prior to that time, because I paid Mr. Ray off before that, and he went back to Indiana about that time.

Q. As to Mr. Dean, do you know when he was working this place?

A. He was out there more or less every few days, all the time. He was working there when I was sinking, and of course, when I found this ore, it was a little surprise to most people to find ore of that quality that near the surface.

Q. Was there any talk around about at that time?

(Testimony of Louis Mason.)

A. It was spoken about more or less down at Silver Bow, where I worked, and by other parties around where I lived. They spoke of it."

By the WITNESS.—Silver Bow Park, that should be.

"Q. Did you go over these other shafts in your examination before? A. I think I did.

Q. And the map that you had heretofore, was used in your examination by Mr. McBride, and was made in conformity with his request. At that time these shafts were numbered and marked as he directed to you, on your map?

A. Yes, he requested me to number them.

Q. Those designation and numbers of these shafts on this map, [811] state whether or not they are the same as those that Mr. McBride requested you to put on the other map.

A. They are, to the best of my knowledge.

Q. And in your examination heretofore, I believe you went at length into the different shafts and openings and designated what you found there, did you not? A. I think the majority of them, yes.

Q. If there is anything now that you think of, that you have left unREFERRED to, you may state it.

A. I think I gave a correct statement of the shafts that I sunk and the openings that I made during the time that I was working on this ground.

Q. And what you found there?

A. Yes, sir.

Q. You were present when Mr. Passmore gave his testimony? A. Yes, sir.

(Testimony of Louis Mason.)

Q. Do you remember anything about the monuments on the Pleasant View location, at the time it was located, the old Pleasant View?

A. Well, in April, 1891, when I obtained this interest, Mr. Passmore went out on the ground with me and showed me the corner and they were small stakes that he had at that time, and I think Mr. Hamilton stated that the law did not require any certain size posts, but the monuments all stand there, and there are a lot of small stakes, and also monuments of stone over there at the corners, and the stones still remain there.

Q. Do you know whether or not these monuments are there now? A. I do know; they are.

[812] Q. They have never been disturbed in any way?

A. Nothing more than just time has kind of moved them, they are straight up and are from 2 to 3 feet in the ground.

Q. Are these corners, to your knowledge, the same as designated on the map? A. I think they are.

Q. Did you ever see the shaft, the discovery shaft, of the Pleasant View?

A. Yes, I cleaned it out in 1895.

Q. Do you remember when Mr. Passmore said it was located? A. Yes, sir.

Q. What year was that?

A. In 1890, April 1, to the best of my knowledge.

Q. When was your first knowledge of that shaft?

A. Well, I knew of work being done there in that year, but I didn't pay no attention to it, until such

(Testimony of Louis Mason.)

time as I obtained my interest in the ground, which was in April, 1891.

Cross-examination.

(By Mr. McBRIDE.)

Q. In your former examination, you made the following statement relative to the shaft you designated as No. 6, and I would like to know where, upon that new map, Exhibit No. 2, that shaft is. I will read you your testimony upon that point. You said in relation to the shaft that you sunk: 'I sunk them down below, out here (indicating) somewhere, about 10 or 12 feet W. And how far distant from the point of discovery?

[813] A. About 120 feet, probably.

Q. One hundred and twenty feet west?

A. Yes, sir, west.

Q. How deep did you sink there?

A. 10 or 12 feet.

Q. Now, mark that No. 6, where you sunk your last shaft.

(Witness marks figure 6 where last shaft was sunk.)

A. And sunk it down there 10 or 12 feet.

Q. And what date? A. In May, 1891.' Now, mark that No. 6, where you sunk that last shaft in May, 1891. Where is that shaft?

A. I think you will find that right here (indicating) the number is not marked; it is marked shaft 5 by 8, that is the size.

Q. And that is the shaft you referred to as shaft No. 6 on the former map?

(Testimony of Louis Mason.)

A. I don't know what is referred to in the testimony as 6, but I sunk that shaft down to a depth of 10 or 12 feet, then later on, I sunk it deeper in the fall of the year.

Q. You identified the shaft which you have pointed out here as a shaft north of the tunnel on your Exhibit No. 1, the No. 2 shaft, shaft 5x8?

A. That, I think, is the size of the shaft at the present time.

Q. Well, that is what is marked on that map?

A. Yes, that is what I understand to be the size, but the information was that that last shaft,—

Q. Was that the last shaft you sunk in 1891?

A. I didn't sink that shaft in 1891; I said I sunk that to a depth of 10 or 12 feet in 1891, but later on, in the fall or winter, I said I sunk it deeper.

Q. Well, is that the last shaft you started in 1891?

A. I don't remember for certain whether it was or not.

Q. But you are certain that you [814] sunk that in 1891 10 or 12 feet, and afterward sunk it deeper?

A. Sunk it deeper, I said, that is, here (indicating). The shaft marked 5x8x29.

Q. From what discovery do you refer to, how far distant from the point of discovery, about 120 feet, what discovery did you refer to?

A. The discovery that is now called the Hornet shaft.

Q. That, you think, is about 120 feet west of the Hornet shaft?

A. I should judge it about that, not measuring it,

(Testimony of Louis Mason.)

but ore was discovered in the Hornet shaft prior to the time of sinking this below.

Q. Could you be mistaken as to the date at which you sunk the Hornet shaft?

A. I don't think so; I can produce evidence as to the time by my time-book.

Q. I will ask you this: If you remember having a conversation with Mr. Kemper about this shaft, the Hornet shaft?

A. Well, sir, I remember about Mr. Kemper coming to me in the Parrot smelter, and I think it was in the year 1892 that he come down, and asked Mr. Dean where he could find me, and he came down there,—

Q. Well, state what you know of your own knowledge, now; you were not present when he asked Mr. Dean where he could find you?

A. No, sir, I was not present.

A. Well, just state what you know of your own knowledge.

A. Well, he came down there to find me in the smelter for the purpose of adjusting the difference between us in our rights, bringing up the compromise and I did not consent to anything.

Q. At that time did he say, or did you say, anything to [815] him about the Hornet shaft?

A. I don't remember whether I spoke to him about the shaft directly or not.

Q. When was the first time you told him about the Hornet shaft?

A. I don't know that I ever told him directly about

(Testimony of Louis Mason.)

the Hornet shaft.

Q. What sinking did you do on this shaft in 1895, on the Hornet shaft?

A. I didn't do any sinking on that shaft in 1895.

Q. What sinking did you do on this shaft immediately before this suit was settled?

A. I didn't do any sinking on that shaft immediately before this suit was settled, the suit of Passmore and others against Kemper.

Q. What work, if any, did you do upon this shaft which you now call the Hornet shaft, just before the settlement of case No. 3620, Passmore against Kemper and others?

A. I didn't do any work on that shaft before this. I never worked in that shaft. I never done any work in that shaft after we concluded to sink it to the depth of 30 feet until last spring, 1900.

Q. You were still in charge of the work that was being done on the Pleasant View lode claim during the year 1895, were you not?

A. Yes, I was at the time.

Q. You were the one that was in charge of the work on that ground for the plaintiff, for Passmore and others? A. Yes.

Q. And if there was any windlass upon that shaft in the year 1895 by virtue of your people, you would know of it, would you not?

A. I would, yes.

Q. Do you remember of your folks bringing a windlass on to that shaft in 1895?

A. They did not, [816] not to my knowledge.

(Testimony of Louis Mason.)

Q. How frequently were you over this ground about March, 1895?

A. I can't say as to the day and dates, but every day I was over there; I was over frequently, every few days. And I also put the discovery shaft of the old Pleasant View, with the assistance of a hired man or two, I don't remember whether there was two or one with me at the time.

Q. What other work did you do immediately preceding the time that this suit was up, from March 16, 1895?

A. For the purpose only of cleaning out the Pleasant View shaft.

Q. What other shafts were there on that ground?

A. Well, I didn't have any windlass on that shaft during that time. I can't say that, for I am confident of it.

Q. What do you have to say, what did you have a windlass on besides the discovery shaft of the Pleasant View?

A. You may find designated here, having been upon the ground, a timbered shaft on the north side, near the south end line of the Copper Queen, sunk to a depth of 48 feet, the old shaft has been worked in three different times, in which there was sinking in the early part of May, and after obtaining a title in that ground, and then later on Mr. Mullins and Tim Sullivan and myself worked that shaft down to about 30 feet, and that is the one that is called the timbered shaft now.

By the COURT.—Q. Is that designated by any

(Testimony of Louis Mason.)

number there, that shaft that is sunk 48 feet?

A. Shaft No. 3, it is designated here, designated 5x7.

[817] By Mr. McBRIDE.—Q. Did you have any talk with Mr. Mullins at the time you were working in that shaft, the timbered shaft, relative to the discovery which you had made in the Hornet shaft?

A. I don't remember whether I had or not.

A. I was interested in the ground with him; I didn't see his deed, the first deed.

Q. Now, why didn't you tell him about this discovery in this Hornet shaft before you permitted him to settle?

A. For the reason that the discovery which is on the north side, the indications were good,—

Q. Why didn't you tell Mr. Mullins about it?

A. Well, I don't know why?

Q. What other shafts beside the timbered shaft did you have this windlass on immediately before the settlement of this case?

A. I cleaned out the old Pleasant View shaft a short time before this case was up one day.

Q. What other shafts did you have there?

A. I didn't work in any others at that time outside of that; Mr. Mullins and I were working in this shaft just prior to the time of this suit; I was not working on any other shaft.

Q. So you did not know the discovery shaft of the Pleasant View just before the settlement, and—

A. Yes, there was solid quartz on the north side of that shaft, and projecting out of the shaft about a

(Testimony of Louis Mason.)

foot, and it has been cleaned out recently and they found, I think, where I designated first, as showing this ore, they dug down about 18 inches deeper and it seems it is solid quartz; that is the old Pleasant View shaft marked discovery [818] shaft Pleasant View.

Q. So that would appear to be solid quartz, or was it merely solid rock and was not a lead at all?

A. Well, it has that appearance now, I am not going to testify that there is a lead there when it is not a lead, only that I cleaned that shaft out and dug into this quartz that was there, and Mr. Wilson examined it and he says it is good quartz, that is the gentleman that Mr. Kemper brought out there to see the quartz, but he says you have not gone far enough to develop the nature of the quartz. That was the shaft designated on the 1st day of April, 1890.

Q. Now, can you tell us some circumstances which would fix the time that Mr. Kemper went into this discovery shaft of the Pleasant View?

A. With Mr. Wilson? How long was that before Case No. 3620 was settled? I think it was a day or two before. He ought to remember it quite well.

Q. Well, just answer the question.

A. Well, I think it was a day or two before it was to be called up in the court.

Q. What happened out at the shaft at the time Mr. Wilson and Mr. Kemper came there to go down, if anything?

A. Well, Wilson, Mr. Tong and Mr. Merrill, I think were the three that came down to examine the

(Testimony of Louis Mason.)

bottom of that shaft.

Q. How did they get down?

A. They had a windlass with them, had a rope. There were no standards up on the shaft at that time, I don't think, and they laid the windlass across the shaft and put the rope on and I assisted them to go down.

Q. That was a day or two before [819] the settlement of this case?

A. I think it was a day or two before the settlement of this case.

Q. Were you not guarding this shaft at that time and there for the purpose of preventing any person from going down?

A. I don't say that I was, no, sir, because I did not consider that I was guarding the shaft; I was an interested party in the ground and I had a right to be there on the ground; I had a right to look after my interests.

Q. You were there for the purpose of preventing these men from going down the shaft at that time?

A. Well, I told Mr. Kemper not to go down; I says, if you get an order from the Court, there will be no objection whatever; I told Mr. Kemper personally.

Q. Were you guarding any other shaft at that time? A. No, sir, I was not guarding a shaft.

Q. Did you have any standards up at the shaft at that time?

A. There may have been one, which I had been using, and left it stand.

(Testimony of Louis Mason.)

Q. Do you know, at that time, if there were standards or a windlass on this shaft that you named and called the Hornet shaft?

A. I don't remember whether I took the standards off or not.

Q. Then you don't remember whether or not you had standards or a windlass upon this Hornet shaft at the time Mr. Kemper and Mr. Wilson and Mr. Mullins visited the discovery shaft in 1895?

A. No, sir, I don't think there was any there.

Q. Was there anybody else working on the ground during this time, immediately preceding the settlement of this case numbered 3620, anybody else that [820] had a windlass or standards erected, outside of yourself, Mr. Mullins and Passmore?

A. Not that I know of.

Q. If there had been a standard or a windlass standing there, erected, on this Hornet shaft, and fresh dirt upon the top of the shaft, taken from the bottom at that time, indicating work there at that time, were you in such a position that you would have noticed it? A. Yes, sir.

Q. And you now say there was nothing of that kind existing?

A. I do say on the shaft designated as the Hornet shaft there was no windlass there.

Q. You never had a windlass on that shaft since May, 1891?

A. Since May, 1891? Yes, I put a windlass on there yesterday.

Q. But up to the settlement of this case?

(Testimony of Louis Mason.)

A. Well, we used a windlass there last year.

Q. But that was after the settlement of this case?

A. Yes, sir.

Q. But between May, 1891, and the settlement of this case, you never had a windlass on this ground?

A. Not until I went to work on that shaft last spring.

Q. And that was after the settlement of that case?

A. Yes.

Q. Why was it, Mr. Mason, that when you had made this last discovery in the shaft now called the Hornet, during the month of May, 1891, that you at once abandoned that nice discovery and went into barren ground and sunk another hole?

A. I think you will find in my testimony before, that I said that my reason for not sinking this shaft here was that Mr. Passmore did not want me to make too much opening or development of the leads.

Q. What was [821] his reason for that?

A. He stated that his reasons were that it might cause the litigation to be more expensive, more expensive; that was the reason he stated to me.

Q. Was that the only reason that you had for abandoning this fine ore body?

A. That is the reason; of course, Mr. Passmore had more interest in the ground than I had, but my views were to sink deeper.

Q. You do not pretend to say that you had a lead in the Hornet shaft prior to May 11th, 1891, do you?

A. Yes. It don't carry much gold there, I will tell you that.

(Testimony of Louis Mason.)

Q. You claim that you had a well-defined lead there?

A. Yes, there is ore there yet for any person to see.

Q. What is the course of the lead?

A. It apparently is east and west.

Q. You were also interested in the Hornet discovery, were you not? A. I am now, yes.

Q. And you helped Mr. Noyles in making his location of the Hornet? A. No, I did not.

Q. Well, you knew what was going on all the time?

A. No, sir, that location was made before I was working there. I got my interest in the location afterwards.

Q. Did you know anything about him going to locate it before going? Did you help him do the work on the shaft, and making that cross-cut, and the location of the Hornet, help Mr. Noyles?

A. No, sir, I did not.

Q. Do you know what Mr. Noyles meant when he used this language in his location notice: 'Cleaned out the shaft thirty feet, 12 foot of a cross-cut, and 12 feet of a lead which shows a well-defined crevice of valuable [822] deposit.'

A. No, I never conversed with him at all.

Q. And if Mr. Noyles says that he had a cross-cut 12 feet in fine lead, you don't know what he meant by using that term?

A. He never made the assertion to me.

Q. You have not examined the location notice of the Hornet?

A. I have not examined the notice; I have not ex-

(Testimony of Louis Mason.)

amined the declaratory' statement. I have seen the notice.

Q. And you have never examined the record, and you don't know that Mr. Noyles asserts that the cross-cut has 12 feet of a lead?

A. No, sir, not of my own knowledge.

Q. Well, do you know by hearsay?

A. No, sir, that is the first time I heard of that.

Redirect Examination.

(By Mr. CONNOLLY.)

Q. Was Mr. Passmore interested with you in these shafts you sunk that you say he did not want to show up too much?

A. Yes, he said to me, sink it down to a depth probably of 8 or 9 feet, he said to me after we had sunk it down to a depth of probably 8 or 9 feet we struck a vein that showed up quite a bit of copper and he would object to me sinking deeper on account that it would cause more litigation.

Q. You were interested with Mr. Passmore at that time? A. Yes, sir.

Q. Who else was interested?

A. Mr. Mullins, and I think Mrs. Hopkins was interested at that time.

Q. Mr. Mullins and Mrs. Hopkins are parties to this action?

A. Mr. Mullins was not interested at the beginning of the work; he bought in in 1895 as near as I can remember; I have never seen his deed, and not [823] having looked at the record, I can't say the date; but I think he obtained his title in 1895.

(Testimony of Louis Mason.)

Q. And how long before the settlement of this suit?

A. I don't think it was very long before.

Q. You were not interested at the time you sunk these shafts? A. No, sir, not until 1895.

Q. Who were the parties interested?

A. Messrs. Passmore, Hamilton and Mrs. Hopkins. And I think another party living in the east that was interested.

Q. That was after the judgment?

A. No, prior to the judgment.

Q. How far is the discovery shaft of the Pleasant View; is it west or nearer town than these other shafts?

A. The Pleasant View, I should judge, was something like six or seven hundred feet further west.

Q. The shaft marked Pleasant View Discovery is how far from the Hornet?

A. I think about six or seven hundred feet, west, towards town.

Q. The Hornet shaft is up on the upper end of the ground?

A. Yes. I think I have the time-book of the time work was done by Mr. Mullins and myself on the shaft near the end line of the Copper Queen, near the settlement of this suit, to show that the work was done, and who done the work at that time.

LOUIS MASON, recalled for further examination on behalf of the defendants, testified as follows:

Direct Examination.

(By Mr. CONNOLLY.)

Q. Mr. Mason do you know the signature of Isaac

(Testimony of Louis Mason.)

Knoyle? A. Yes, sir.

Q. Did you see him sign that signature there?

A. Yes, sir, I saw him and Mr. Kift sign it.

Q. And is that your signature [824] there?

A. Yes, sir.

Q. What is this document?

A. It is a lease and a bond upon the Hornet quartz lode mining claim.

Q. It is a lease and a bond upon the Hornet quartz lode mining claim, about which we have been testifying here? A. Yes, sir.

By Mr. CONNOLLY.—We offer this in evidence, if the Court please.

(Mr. CONNOLLY reads lease and bond, which is as follows:)

“LEASE AND BOND.”

“This indenture made and entered into this second day of May, 1900, by and between Isaac Knoyle and Samuel Kift, parties of the first part, and Louis Mason, party of the second part, witnesseth:

That the said parties of the first part do hereby lease and to mine let, unto the said party of the second part the Hornet quartz lode mining claim, situate in Summit Valley Mining District, Silver Bow County, Montana, and located in section 16, T. 3 N. R. 7 W. said county; and lying northerly from the Bull Whacker lode claim, for a term of three years from and after the first day of May, 1900; and the said second part shall have the right to immediately enter upon the said quartz lode claim and to mine and extract ores therefrom, and to carry away, sell, dis-

pose of, smelt and convert to his own use all of the ores and minerals which may be extracted during the term of this lease; that said second party shall do all the work and mining in a good workmanlike manner and securely timber all openings wherever necessary to the proper protection of the same, and proper mining of said lode claim. And the said first parties [825] do hereby deliver possession to the whole of said quartz lode claim, to the said second party for the purpose of carrying on mining and doing mining work therein under this lease. As part of this lease, it is further agreed and understood that the said party of the second part shall have the right at any time during the time of this lease, to purchase the interest of the parties of the first part in and to said quartz lode claim. And the parties of the first in consideration of the said second party taking said lease, and of the sum of one (\$1.00) dollar in hand paid, do hereby bind themselves to sell and convey unto the said second party or his assigns all their right, title and interest in and to said quartz lode mining claim at any time within two years hereafter, and to make, execute and deliver a deed of conveyance, conveying their said interest, provided said second *part of* his assigns shall pay to the said first parties for their right, title and interest in and to said quartz lode claim at any time within two years, the sum of \$500.

IN WITNESS WHEREOF, the said first parties

have hereunto set their hands this second day of May, 1900.

ISAAC KNOYLE.
SAMUEL KIFT.
LOUIS MASON."

State of Montana,
County of Silver Bow,—ss.

On this second day of May, 1900, before me, John W. Cotter, a Notary Public in and for the County of Silver Bow, [826] Montana, personally appeared Isaac Knoyle and Samuel Kift, proved to me upon the oath of James Knoyle to be the persons whose names are subscribed to the foregoing instrument, acknowledged to me that they executed the same.

IN WITNESS WHEREOF I have hereunto set my hand and affixed my notarial seal, the day and year in this certificate first above written.

[Notarial Seal] JOHN W. COTTER,
Notary Public in and for the County of Silver Bow,
State of Montana.

I hereby sell, assign and transfer the foregoing lease and agreement, and all of my rights therein and thereunder to R. O. Merriman.

Dated May 2nd, 1900.

(Signed) LOUIS MASON.

[Endorsed]: Indexed. Compared. Recorded in Volume A of Leases, page 457, May 24, 4:08 P. M., 1900.

J. E. MORAN,
County Clerk and Recorder, Silver Bow County,
H. E. Burke,
Deputy.

(Testimony of Louis Mason.)

Two dollars paid. Mailed R. O. Merriman, 905 Delaware Avenue."

Q. (Mr. CONNOLLY.) Mr. Mason, when you were on the stand before you referred to certain dates, which you said you could prove conclusively by your memorandum-book; have you got your memorandum-book with you? A. I have.

Q. Will you produce it? What were those dates that you were referring to generally, in connection with what matter?

A. It is in connection with the sinking [827] upon the upper portion of this dispute ground and the discovery of the leads.

Q. Do they involve the Hornet? A. Yes, sir.

Q. Now, refresh your memory from your memorandum-book. I will get you to state what dates specifically that work was done, first getting you to testify as to whether those memorandums were made at the time and on the dates and at the times of the—

A. This is a memorandum—

Q. What is that book you have in your hand?

A. It is a small book that I kept time in of the parties working on the ground in April and May, 1891.

Q. And how long have you had that book?

A. I have had it since 1891.

Q. Where has it been kept?

A. I have kept it at home in a trunk.

Q. Been in your possession ever since, has it?

A. Yes, sir.

(Testimony of Louis Mason.)

Q. In whose handwriting is the memorandum?

A. It is in my own handwriting.

Q. And in what way was it made, that is to say by reports of parties working for you, or by personal inspection of yours on the ground?

A. It is made by my own handwriting of each and every day as they worked.

Q. Did you see them working there?

A. Yes, sir.

Q. And that book was made up from your own knowledge? A. Yes, sir, it was.

Q. And you have several entries there in your book, have you not? A. Yes, sir.

Q. Now, when were those particular entries made; were they made all together or separately?

A. They were made separately each day as the day's labor was performed.

Q. And in your own handwriting? A. Yes, sir.

Q. Now you may refresh your recollection from this memorandum-book, and tell us when these parties—I believe Poor and Ray, you testified to?

A. Yes, sir.

[828] Q. Worked for you on the Hornet Discovery shaft?

A. It is not designated exactly on the Hornet shaft here.

Q. Well, if you know of your own knowledge?

A. I know of my own knowledge where they worked. They commenced work on the 20th day of April, 1890, and on the 20th day they worked four

(Testimony of Louis Mason.)

and a half hours and they began work on the north side of the claim and sank three shafts there to a depth of ten or twelve feet on the north side. I think you will find that I testified to that before.

Q. Was that 1890? A. In 1891, in April.

Q. What does your memorandum-book show?

A. It shows that this labor was performed in April, 1891, that I am speaking of now.

Q. Well?

A. And they worked continuously on up—well on the 25th they laid off, the boys that were working for me, the men; then they worked the 26th, 27th, 28th, 29th, and 30th.

Q. Of what month? A. Of April, 1891.

Q. Did they work any longer than that?

A. Then they commenced on the 1st of May, 1891, 1st, 2d, 3d, 4th, 5th, 6th, 7th, 8th and 9th. That is the time of Grant Poor.

Q. That is the amount of Poor's time?

A. Yes, sir.

Q. Now have you the time of the other parties?

A. Yes, sir.

Q. Who is the other party? A. Ely Ray.

Q. When did he commence to work?

A. On April 21st. I have got it marked the 21st; it does not show the amount of that day; the 22d, 9 hours; 23d, 10 hours; 24th, 4 hours; 25th was absent; 26th, 10 hours; 27th, 11 hours; 28th, 11 hours; 29th, 11 hours; 30th, 11 hours; on May 1st, 6 hours; 2d, 11; 3d, 5; 4th, 11; 5th, 11; 6th, 10; 7th, 11 hours;

(Testimony of Louis Mason.)

[829] 8th is blotted out so that I cannot see very distinctly, whether it is absent or not. It looks as though it was marked two ciphers; 9th, 11 hours; 10th is not marked—it is marked on the 10th, but not marked whether he worked or did not work.

Q. That was the Mr. Poor and Mr. Ray, the witnesses have testified, seeing out there at the time?

A. They are not in the state, Mr. Poor is dead.

Q. No, I say, they are the parties these other witnesses testified to having seen out there?

A. Yes, sir.

Q. Mr. Mason, since you have been on the stand before have you made an examination of the fresh cross-cut in from the tunnel there, from the Gulf location or discovery, and Hornet? A. Yes, sir.

Q. What have you to say as to whether or not that is a continuous vein from the tunnel through all the way?

A. In my opinion it is the same lead matter; we find the same mineral deposits in the opening made from the Gulf discovery shaft to the Hornet discovery shaft; find the same character of ore in the opening between the two shafts, and the same ore between the Gulf shaft and the tunnel.

Q. Now, I would get you to state at this time whether or not when the order was made in this case enjoining you from working upon that property you were taking out pay ore, and if so what it paid?

A. We were taking out pay ore at the time we were enjoined.

Q. And before you were enjoined did you receive

(Testimony of Louis Mason.)

any money for the ore that you had taken out?

A. Yes, sir.

Q. From the beginning? A. Yes, sir.

Q. How much?

A. Well, I have got two, three certificates [830]
with me of shipments.

Q. Well, you got your money, didn't you?

A. Yes, sir.

Q. Well, that is the best evidence I expect. You
did not make the certificates yourself?

A. No, sir, I did not.

Q. How much did you receive for your ore there,
about?

A. Well, the first shipment was a small amount of
a ton, 145 pounds, I think; that was taken out be-
tween the Gulf shaft to the present course of the
tunnel and in that return, I think it is sixty some odd
dollars, I have got the certificate with me that shows;
and then there would be seven tons sorted out, while
we were running this cross-cut from the Gulf north.

Q. To the tunnel?

A. To where the tunnel is now, and that we shipped
and I think they said it was a fraction over seven
tons, if I ain't mistaken, that return was sixty odd
dollars.

Q. Making how much in all?

A. Making about \$130.00 from the Gulf shaft to
the present course of the tunnel.

Q. And that I believe the testimony shows is about
ten or how many feet?

A. Well, I should judge from the north side of

(Testimony of Louis Mason.)

the Gulf shaft, it is about 12 feet to the south side of the tunnel.

Q. Mr. Mason do you know what time of your own knowledge that ore was in the sacks on the surface of the Hornet Discovery was thrown back in the hole?

A. Well, I think it was about the 9th or 10th for the reason that,—

Q. Of what?

A. Of May, 1891. I was not present as I stated before. The parties I had employed that day, stated that.

Q. Now we don't care what they stated, but go ahead. I believe you went over that about the [831] matter with Mr. Kemper? A. Yes, sir.

Q. But of your own knowledge when that ore in the sacks was thrown back in the shaft, of course, if you have any way of refreshing your memory you may state it.

A. I have not a memorandum of the exact date, but I went out there that same evening of the day that I was informed that the notice had been posted, and it was destroyed or thrown down the shaft. I went down the shaft. I think you will find I testified to that before, and got the notice. It was torn up considerably, *and put* it together and read it, but I did not keep it, and I do not remember the name that was signed on the bottom of the location notice.

Q. What connection is there between that and the casting of the ore back into the shaft?

A. Well, I threw the ore down the shaft at that time, poured it out of the sacks down the shaft.

(Testimony of Louis Mason.)

Q. Yes, sir, and did you again see that location notice with the box or other wooden material there?

A. No, sir, I left them in the bottom of the shaft.

Q. Have you seen them since?

A. I have. Last year, 1900, Mr. Knoyles was going to clean the shaft out. I cleaned it out to a depth of about 20 feet prior to the time Mr. Knoyles worked in 1900. That is in May, I believe. I have got a time-book at home of the work, but not here, and when he started to clean it out I told him that he would find in the bottom of the shaft the piece of an old ladder, probably four or five feet long and a stake—

Q. Yes, no conversation between yourself and Mr. Knoyle, Mr. Mason. [832] You may state if you saw that old piece of shaft and the box, and whether it was before Mr. Knoyle cleaned that out or after.

A. I seen them after he cleaned the shaft out, I saw those pieces of wood again.

Q. Where were they? A. On the dump.

Q. Mixed in—

A. That is, I should judge them to be the same pieces of wood. Of course, I didn't see them taken out of the shaft the day that he took them out.

Q. Why did you throw that ore back in the shaft; in the first place by whose direction were you working there?

A. Well, the same as I have stated before, Mr. Passmore objected to me developing all the leads too much on account of causing the litigation to be more expensive; it was not my will. I was endeavoring to

(Testimony of Louis Mason.)

develop the leads and mining if there was pay ore to be mined.

Q. Who owned the largest interest in that; did you own any interest at the time?

A. I owned an eighth interest, or this eighth interest was deeded and in escrow at that time.

Q. You didn't have it?

A. No, it was not in my possession then; it was to be turned over to me when I complied with my agreement.

Q. Mr. Passmore was your employer or was over you in the matter? A. Yes, sir.

Q. And his wishes with you went?

A. I was subject to his direction, yes, sir.

Q. Is there anything else that you desire to call attention to? A. Not that I think of at present.

[833] Cross-examination.

(By Mr. McBRIDE.)

Q. You was a party to that compromise that occurred between the placer people on one side and the Pleasant View people on the other?

A. I was Mr. McBride, but it was against my—

Q. Now, just wait a minute. Answer the question, then stop, your attorney will take care of it and we will get along faster. A. Very well.

Q. In making the compromise you exchanged a one-eighth interest in the Pleasant View for a one-eighth interest in the Placer?

A. For a portion of the placer?

Q. Yes; and the one-eighth interest in the placer covered ten acres?

(Testimony of Louis Mason.)

A. Yes, sir, it is about ten or twelve acres, yes, sir.

Q. Your Pleasant View location here contained about twenty acres? A. Yes, sir.

Q. So you was getting about half as much ground as you would have held if you had held it under the Pleasant View?

A. I beg to differ with you, the Pleasant View and the bond of the Pleasant covered something near twenty-three acres, or four, and it did not cover all the ground that is covered by the Butte & Boston placer, consequently in this ten acres I did not receive but a fraction over a third.

Q. About one-third then?

A. Something like a third interest.

Q. In this work that was being done for yourself and for Mr. Passmore and Mr. Hamilton and those interested in the quartz claim, was it your intention or Mr. Hamilton's intention, when you started in there to prove up this ground to [834] be quartz ground? A. Yes, sir.

Q. The work that you did there towards developing what you considered quartz for the purpose of finding a lead was done in good faith, was it not?

A. Yes, sir.

Q. It was the honest intention of all the parties to prove that up to be a quartz claim if they could.

A. Why, it certainly was the intention.

Q. Now, when the time came, when it was necessary to either try this case or compromise, was it the honest intention of these people, yourself among others, to do the best that you could for yourselves

(Testimony of Louis Mason.)

under the circumstances?

A. Well, Mr. Hamilton, spoke to me first in regard to the compromise and I stated to him that I would never take the stand and swear that there was not quartz discovered there, and that I never would make any affidavit or testimony to the effect that quartz was not discovered there, prior to May 11th, during April and May.

Q. You were in the minority, were you, Mr. Mason?

A. I hadn't only an eighth interest.

Q. And the other then had seven-eighths?

A. Other parties owned seven-eighths.

Q. Mr. Mullins is one of the parties who owned the seven-eighths?

A. I think he was, yes, sir.

Q. And that seven-eighths were of the opinion that they could not prove that there was a lead within the boundaries of the Pleasant View lode claim at that time, were they not?

A. Mr. Mullin did not speak to me in regard to that, Mr. Mullin, I think, knew, I am confident he knew there was leads there.

[835] Q. Now, then the $\frac{7}{8}$ ths were all of the opinion that they could not show up a lead in that ground, were they not?

A. I could not say whether Mr. Mullin was of that opinion or not.

Q. Now, then those that overruled you, certainly were of a different opinion, were they not?

A. Well, I could not say as to that.

Q. So that you pretend to tell this court now that

(Testimony of Louis Mason.)

the 7/8ths thought the same way that you did in this matter, is that so?

A. I did not state that so, Mr. McBride. I said I don't know what Mr. Mullins' opinion was in regard to it.

Q. Yes, now then. These seven-eighths, do you know what the owners of the seven-eighths thought or what they said in any conference that you had which culminated in the settlement of this controversy between the placer on the one side and the Pleasant View on the other side, relative to a lead having been discovered prior to May 11th, 1891, within the boundaries of the Pleasant View lode claim.

A. I could not say whether Mr. Mullin had any knowledge in 1891 of the discoveries or not, but the discoveries were made I know that of myself.

Q. Now, if the reporter will kindly read the question again, I will ask Mr. Mason to answer.

Question read.

By Mr. CONNOLLY.—Objected to on the ground that it is immaterial, irrelevant and incompetent and hearsay, also on the ground that the compromise itself is the best evidence.

Objection overruled by the Court and exception noted by counsel for the plaintiff.

By Mr. McBRIDE.—I wish you would strike out that word "thought" so that the witness is not [836] required to answer what they thought. I do not want you to answer that; just what they said, Mr. Mason.

After which the following question was read again

(Testimony of Louis Mason.)

to the witness, the word "though" being eliminated: "Yes; now, then, those seven-eighths, do you know what the owners of the seven-eighths said in any conference that you had which culminated in the settlement of this controversy between the placer on the one side and the Pleasant View on the other."

A. I do not remember of Mr. Mullins speaking to *anything* in regard to whether he knew of the existence of the lead in 1891, or not.

Q. In your time-book that you have there, Mr. Mason, does it show that these men, Mr. Ray and Mr. Poor, stopped work, one on the 9th and the other on the 10th of May, 1891?

A. That is as far as I have got the time on this book, and I have got no further record. I lost one small book that I had, that kept a good deal of time in. I don't know whether I had any time of work for them in that book or not.

Q. The fact is that they continued work on this ground for a considerable length of time after May 11th, isn't that so? A. I don't think so, no, sir.

Q. How much longer did they work there?

A. I could not say that they worked any longer.

Q. Do you know that they did not work longer on that ground?

A. They might possibly have worked longer on some other shaft in that ground in that year at some time.

Q. That is a bare possibility, is it?

A. I say they may have worked, those parties, for me on that ground later on in the year.

(Testimony of Louis Mason.)

[837] Q. Did not these two men work for you, don't you know that of your own knowledge that they worked for you after May 11th, 1891, on that ground?

A. I haven't got any book account of it.

Q. So that you have no memory now as to whether they did or did not.

A. No, sir; I think you will find that I stated—

Q. Now, just answer the question. I don't know what you stated; the record shows it. Now, then, Mr. Mason, independent of your book, have you any personal recollection that these men worked for you from May 1st, to May 9th on that ground?

A. I have not a book account of it.

Q. Now, leaving the book aside independent of that, have you an independent recollection of that so that you could testify without the book as to that fact? A. Yes, sir.

Q. So that between May 1st, and May 9th you have an independent recollection? A. Yes, sir.

Q. And following May 9th, you have no recollection whatever as to where these men work; is that so?

A. I have stated that I may have had men working on that ground later on in the year different places.

Q. You also state that you have no recollection whether these men worked for you after May 11th, on that ground or not. A. I have stated before.

Q. Do you so state or did you not?

A. I was going to answer you Mr. McBride, I stated before I paid Mr. Ray off and he went back home about the 10th or 11th.

Q. Well, you have no recollection now whether they

(Testimony of Louis Mason.)

worked for you after May 11th, or not have you?

A. I don't think Mr. Ray did without I can find some accounting or something to show that he did.

Q. Who was it sunk for you the shaft that [838] you have designated as shaft No. 6 on your map?

A. I had several parties working for me at different times there. Mr. Crismon worked for me on that ground.

Q. Then who else?

A. Well, I have stated before that Mr. Ray and Mr. Jones and Mr. Smith of Indiana and I am not positive but I think two other Jones boys in Indiana worked for me in that ground.

Q. Have you got any account of when and where they worked there?

A. I have not; as I have stated I lost another book in which I had time kept in.

Q. Is there anything in this book that you have testified from showing in what particular shaft these men worked? A. I don't think so.

Q. There is nothing which shows that they started in the shaft No. 1 on the 21st day of April, is there?

A. No, sir.

Q. Nor that they started in on shaft No. 5 on the 1st day of May?

A. I have stated that there is nothing in that book giving exactly what shaft they worked on.

Q. Nothing indicating the shaft at all, is there?

A. Well, there is time kept for work on that ground sinking and prospecting on that ground.

Q. The shaft that you have now marked No. 3 on

(Testimony of Louis Mason.)

your map is a timbered shaft, is it, and it is about 30 or 40 feet deep.

A. Where is it situated?

Q. In what—

A. Yes, sir, that shaft is about 48 feet deep and I stated before that that shaft had been worked on at three different times.

Q. So that prior to May 11th, 1891, it was not more than 10 or 12 feet deep; is that your proposition?

A. On shaft No. 3 you mean?

Q. Yes.

A. That was about 10 or 12 feet in April, [839] 1891.

Q. Yes, was it any deeper than that on May 11th, 1891?

A. No, sir; it was not worked in again until 1895 to the best of my recollection.

Q. I believe you stated, Mr. Mason, that you had no experience in quartz mining in 1891.

A. Well, I don't think I stated that, Mr. McBride.

Q. I understood you to state on your former examination that that was your first experience in prospecting for quartz mining and that all you had—

A. I was working in the smelters most all that time, but at some time I had been in different shafts and small mines and prospected around this country and examined the leads from the first week. You may say I landed in Butte.

Q. Well, you had not been in Butte very long, had you? A. I came here in 1887.

Q. Had been here then four years?

(Testimony of Louis Mason.)

A. In March, 1887, I think on the 20th day.

Q. And your work had been confined to looking over the hills and going down into shafts without having had any actual experience in quartz mining.

A. Well, I paid very close attention, Mr. McBride, to the mineral industry here in Butte, because I have been in Butte ever since that time with the exception of once in a while I would go out for a short time.

Q. You never did work in a mine, did you?

A. Yes, sir.

Q. Was that prior to 1891 or after?

A. I never worked in a mine prior to 1891, though I have sampled, took samples in mines and inspected leads in various prospects and mines from the first time I came to Butte.

[840] Redirect Examination.

(By Mr. CONNOLLY.)

Q. Mr. Mason, you testified that you were a party to the compromise and you started to explain that it was against your wishes when counsel stopped you. Were you a party to that suit?

A. I don't know as my name is known in the suit or not. I have never read the papers.

Q. Did you have any interest in that property at that time actually? A. Well, at the time—

Q. Or was the deed in escrow?

A. The deed was in escrow. I am quite sure when the application for patent was made.

Q. When that suit was settled, did you have title?

A. Yes, sir.

Q. And you said you had a one-eighth interest?

(Testimony of Louis Mason.)

A. Yes, sir.

Q. You started to explain that that matter was contrary to your wishes; you may explain anything you desire of that kind.

A. Mr. Hamilton approached me first in regard to the compromise and I told him I would never testify nor never make any affidavit that there was not leads discovered. I says I have opened two veins and I will never testify that there is not quartz there.

Q. Now, immediately after the settlement or compromise, did any of the parties to that compromise besides yourself do any work for quartz ground out there the same day or the next day?

A. There was a location made on the same day.

Q. Covering the Butte & Boston placer?

A. A portion of the Butte & Boston placer. Lee Davenport is the gentleman that made the location, it was Lee Davenport.

Q. Do you know that that is a fact that [841] Lee Davenport went out there in the interest of certain parties?

A. Yes, sir. I had the deed with me here that Mr. Davenport made me, a deed to an interest in that location, quartz location.

Q. Well, now, who were the parties that sent Mr. Davenport out there, if you know, who made that quartz location and when did they send him?

A. Well, it was on the same day of the compromise, and I could not say exactly whether it was Mr. Passmore or Mr. Hamilton sent him out there.

[842] Q. Mr. Passmore has testified that he had

(Testimony of Louis Mason.)

no interest in that ground at the time of the suit.

A. Yes, sir, he has testified.

Q. You are aware of that.

A. But Mr. Passmore I am quite sure told me Mr. Davenport had gone out.

Q. Did Mr. Hamilton, to your knowledge, send Mr. Davenport out there?

A. I could not say of my own knowledge.

Q. Do you know whether Mr. Mullins had anything to do with it? A. I could not say.

Q. Do you know whether Mr. Hamilton or Mr. Mullins received any interest or got any interest in that quartz location made at that time?

A. I did not see them receive any deed nor I never seen any deed that they should have received, or I don't know of my own knowledge if they ever received a deed, but Mr. Davenport told me that he made deeds to them.

Q. Well, you say that was the same day of the compromise. A. Yes, sir.

Q. You mean the entering of the judgment, or a compromise in writing after the entry of the judgment?

A. It was the day the compromise was affected and I think it was the 14th day of March, 1895. I could tell probably by looking at this deed; I think it was made on the same day.

Q. What deed was that?

A. The deed that Mr. Davenport made to me from this Linear location.

Q. Then you were a party to this Linear location

(Testimony of Louis Mason.)

made on the very same day of that compromise, were you? A. Yes, sir, I received that deal.

Q. Then so far as your good intentions were concerned or your good faith, you went out immediately after [843] this compromise, which declared this a placer claim, and sank or looked for quartz, did you?

A. Well, I received an interest in the location, yes, sir.

Q. Were you a party to that thing at that time?

A. Which, a party to the making of the location, do you mean?

Q. Yes.

A. Well, Mr. Davenport went out to make the location for the people interested.

Q. Let us see the deed and give us the date when the settlement was made. What date is this? Refresh your recollection from that deed and say what date it was?

A. This is on the 14th of March, 1895.

Q. And what was the date of the compromise, you say the same time? A. The 14th of March.

Q. Now, then, this deed was made to you immediately after the location, was it not?

A. Yes, sir, it is not on record.

Q. That is a deed from Lee Davenport and wife to yourself? A. Yes, sir.

Q. For a one-eighth interest in the Linear quartz lode claim? A. Yes, sir.

Q. And I believe you have testified that the Linear is the same location practically as the Hornet now?

(Testimony of Louis Mason.)

A. The location made in the same shaft that the Hornet location is now.

Q. Have you ever had any conversation with Mr. Mullins in regards to his idea of that ground at that time or since, showing his good faith for intentions?

A. I obtained a bind in February, I think it is, 1896, of Mr. Mullins and on Mr. Hamilton's interest; the bonds was made to myself and Mrs. Hopkins.

Q. Mr. Mason, I will get you to state whether or not you know from anything [844] that was said by Mr. Mullins or Mr. Hamilton afterward that they had an interest in the Linear location. That they were interested in the location I will say.

A. Mr. Mullins and Mr. Hamilton, and Mrs. Hopkins paid their portion according to their interest for work done in 1895 on the Linear location.

Q. For what kind of work? A. Sinking a shaft.

Q. What for?

A. For the development of the lead.

Q. Representation work? A. Yes, sir.

Q. Do you know anything about the representation work that was done in years previous to 1895 and before then? A. Before 1895?

Q. Yes. A. I don't understand your question.

Q. Do you know anything about the representation work that was done on that Linear location before 1895 if there was any done?

A. No, sir, the location was not made until 1895.

Q. But there was some work done out there in 1891 immediately at the time—or that was the compromise in 1895? A. Yes, sir.

(Testimony of Louis Mason.)

Q. And how do you know they paid for their portion of that location work?

A. I received the money for the work.

Q. Who did the work?

A. Not all of the work; Mr. Sullivan, a gentleman who worked for Mr. Hamilton or for Mr. Mullins, I mean, he was boarding at Mr. Mullins' house at that time, and Mr. Mullins settled with him, himself.

Q. Well, you had a settlement with Mr. Mullins for money, did you, yourself? A. Yes, sir.

Q. Now, did you have any conversation in regard to representation work on that claim with Mr. Mullins and Mr. Hamilton in 1896, the year afterward?

[845] A. I asked Mr. Mullins in 1896 if he had not better represent it and he said that he didn't think it was necessary that the patent was issued. I also asked Mr. Hamilton in regard to representing and he said he didn't think it was necessary that the patent was issued. I went and saw Mrs. Hopkins—

Q. That was the placer patent?

A. Yes, sir, the placer patent was issued.

Q. Go ahead.

A. I saw Mrs. Hopkins in regard to representing the Linear in 1896 and she stated that she thought that it ought to be represented; that she had had a good deal of trouble over such titles before and in her opinion it ought to be represented, but if Mr. Mullins and Mr. Hamilton did not think best to represent, she would not.

Q. You know Mr. Merriman your codefendant here, R. O. Merriman? A. Yes, sir.

(Testimony of Louis Mason.)

Q. Your interest in this claim or your title is derived from whom? A. From Mr. Merriman.

By the COURT.—In what claim is that?

A. In the quartz location made, the Gulf, Hope, Olivia, Rabbit, and Hornet.

Q. That deed was made from whom to whom, Mr. Mason?

A. From R. O. Merriman, to Louis Mason, myself.

Q. What was the date of it, can you remember?

A. I do not. The latter part of May, I think, 1900, or the 1st of June. I think it was the latter part of May, though as near as I can remember.

Recross-examination.

(By Mr. McBRIDE.)

[846] Q. This Linear location, Mr. Mason, was that any better than the Pleasant View location?

A. I should consider it quite a good deal better. Yes, sir, where the location is made on a vein.

Q. Because you had no discovery on the Pleasant View is that it?

A. I testified the other day that the shaft had been cleaned out and sunk 18 inches deeper, about 18 inches apparently on the side where I saw the quartz before, and it appeared to be a boulder of quartz, not rock in place.

Q. So that in your judgment at that time the Pleasant View location had gone by the board, and it was necessary if you continued to find at all, to get a new lode somewhere, and with that object in view you had Mr. Davenport go out there and put up a notice on the Linear location?

(Testimony of Louis Mason.)

A. No, sir, I didn't consider that Pleasant View location not good until last—this month. It was, when it was cleaned out and they sunk down 18 inches or so deeper and showed that it was not a regular vein but a body of quartz that was deposited there, then I came to the conclusion that there was no lead there in sight.

Q. That was the first time that you knew that the Pleasant View location was not good?

A. Yes, sir.

Q. But this Linear location as you understand it, and in which you participated was made for the purpose of giving you another fighting chance in the event that you did not complete the compromise with Mr. Kemper; is not that so?

A. I do not consider it that way; my understanding was that they [847] did not consider the placer title good.

Q. Do you not know as a matter of fact that this was posted there before the compromise was effected?

A. No, sir, I don't know that to be the fact.

Q. You don't know whether it was or was not?

A. I don't think it was.

Q. Do you not know as a matter of fact that this posting was on the 14th of March? A. Yes, sir.

Q. And the compromise was not effected until the 16th of March?

A. I don't think so. My knowledge is that on the 14th of March at nine o'clock this compromise was effected.

Q. And that the judgment was not taken until the

(Testimony of Louis Mason.)

16th day of March?

A. Well, I can't say. I have not seen the record to that effect.

Q. Don't know anything about that? A. No.

Q. Now, Mr. Mason, you state that you told Mr. Hamilton when he came to you relative to this compromise that you would not swear that there was not a lead within the boundaries of the Pleasant View lode claim. A. Yes, sir.

Q. Did Mr. Hamilton ask you to swear that there was no lead in that ground? A. No, sir.

Q. He did not insist on your swearing in that direction, did he? A. No, sir.

Q. What he wanted was, for somebody to swear that there was a lead, isn't that so?

A. I don't know whether he did, no, sir, I don't know. He never intimated that to me.

Q. Well, you knew that, you was familiar with the case as an experienced miner, that in order to win as against the placer, that it would be necessary for somebody to swear that there was a lead, with one well-defined [848] wall within the boundaries of the location, did you not?

A. I said to Mr. Hamilton that my opinion—

Q. Now, then, answer my question, what you know about it being necessary for someone to swear that there was a lead there within the limits of some location that had a well-defined wall; did you or did you not understand that?

No response.

Question read.

(Testimony of Louis Mason.)

A. Yes, sir, I know that it is necessary to make a discovery before you can make a location, make a discovery of a lead vein matter, mineral bearing rock, quartz.

Q. And when Mr. Hamilton was around looking for somebody to prove up this location instead of telling him that you could swear to the lead you told him that he could not get you to swear that there was a lead there, is that so?

A. What place are you alluding to?

Q. I am alluding now to the Pleasant View location.

A. The discovery of the Pleasant View?

Q. Yes, sir.

A. I stated to Mr. Hamilton that I had discovered leads in that ground and ore, and that I would never testify that there was not leads on that ground.

Q. Do you know why Mr. Hamilton did not call you as a witness then and prove up location?

A. No, sir, I don't know exactly why now; in his reason he did not state to me but he came to me first and spoke to me about the compromise that I made this statement to him in regard to the leads.

Q. You knew as a matter of law, being an experienced miner, [849] that if you had a valid location there that it was superior to the placer application, did you not? A. Yes, sir.

Q. But notwithstanding your knowledge you joined with the others in the compromise, permitted to go against you, or the party for whom you stood, the party who stood for you, to the effect that there was no lead within the boundaries of the Butte &

(Testimony of Louis Mason.)

Boston placer claim, is that so?

A. I stated to Mr. Hamilton that there was leads discovered and that I would not testify that there was not leads in that ground and that I was opposed to a compromise.

Q. And so stating and so knowing you joined with the others in the compromise, took a deed for an interest in the placer ground, permitted judgment to go against you to the effect that there was no lead within the ground; is that so? Answer yes or not.

A. I submitted to the compromise for the reason that I was not able to protect myself in fighting of the suit; I had not the finance, the money to fight the suit.

Q. That is you did consent to the compromise and did join with the others and permit this judgment to be taken against you?

A. Why I must have consented or it would not have been settled, of course, but it was against my will.

Q. Was this escrow deed that you refer to made out before you went to work? A. Yes, sir.

Q. That deed has been recorded has it?

A. I think it has.

Q. And before this compromise was effected it had been delivered to you? A. Yes, sir.

[850] LOUIS MASON, called in surrebuttal, on behalf of the defendants, testified as follows:

Direct Examination.

(By Mr. CONNOLLY.)

Q. Mr. Mason, you have heard Mr. Mullins' testi-

(Testimony of Louis Mason.)

mony? A. Yes, sir.

Q. You have heard the testimony of Mr. Kemper, Mr. Mason, did you? A. Yes, sir.

Q. Did you say to him at any time that there was no lead out there on that ground, but that there would be a lead there some day?

A. No, sir, I never used the assertion.

Q. Or anything of the kind?

The WITNESS.—I never denied the existence of a lead out there to Mr. Kemper; I never had any conversation; I have always spoken of the discovery of quartz there in 1891."

The WITNESS.—That was the whole of my testimony as I gave it in 1901, in this case of the Butte Land and Investment Company against Merriman and others, with the exception of the portion I objected to as it was read; I don't know of any other testimony that I gave; I thought there was testimony introduced in there relative to the validity of the placer application for patent in the placer ground. I said that recently shafts 1 and 2 had been cleaned out by me, and that I judged their depth at that time to be about twelve feet, judging the depth from a ladder which was leaned up against the side. When I testified in this case a few days ago I said the depth of shaft No. 1 was from 15 to 13 feet deep, and if you read on you will find that I said Mr. Kemper sunk them deeper after I had cleaned them out; I suppose Defendants' Exhibit No. 2 shows the workings in the vicinity of the Gulf Discovery as they existed on the ground at the time when the map was made,—the ex-

(Testimony of Louis Mason.)

hibit in case 9,000.

Q. I will call your attention to the fact that it shows a cross-cut northeasterly from the Gulf discovery, but none southwesterly. That was the condition at the time the survey was made for that map?

[851] By General NOLAN.—Object to that as repetition. Judge Bourquin went into that and they finally agreed that probably this map was made some time before the cross-cut was completed into the shaft.

By Mr. SHELTON.—I think, Colonel, that you have a recollection of the question that was put to another witness,—Mr. Barker. I do not think Mr. Mason was asked that. The map shows the cross-cut from the Gulf to the Mullins tunnel; at the time that map was made I do not think that cross-cut was opened through there, but immediately, or very shortly after that map was made,—that is my memory of course. The map was made during the hearing of suit 9000, February, 1901, but that suit extended over quite a little different period of time. It was adjourned from time to time and it covered quite a space of time from the beginning unto the close. After the injunction I did no further work in the way of taking out ore; the cross-cut was extended from the Gulf to the Hornet during that hearing; I think you will find that the Court was petitioned for permission to do that, for the purpose of showing the connection from the tunnel to the Hornet shaft, the lead extending across.

(Testimony of Louis Mason.)

Redirect Examination.

(By General NOLAN.)

The WITNESS.—When these shafts were sunk by me in 1891, 1, 2 and 9, I did not make measurements of the depths of the shafts, I just judged by the looks; the testimony that has been read here was given about eleven years afterwards; these shafts were not sunk any deeper in 1901, with the exception of two, I think, and the others were in the same condition, with the exception of filling up with wash. I did not sink shafts 1, 2 and the Hornet shaft in the years succeeding 1891 down to [852] the present time, any deeper. Shaft No. 3 was sunk deeper; that shaft has been worked in three different times, and it was sunk to a depth of about 48 feet the last time I worked on it. I think there was a further sinking of shaft No. 1 by Mr. Kemper in November, 1911; I should judge he sunk it from 2 to 3 feet deeper. Shaft No. 2 is deeper now than it was when it was sunk by me in 1891,—3 or 4 feet deeper, I should judge, or two and a half. Mr. Hamilton and Mr. Mullins told me that they had effected a compromise, when I came up to the city in the morning about nine o'clock, prior to the time it was to be called in court. They spoke,—Mr. Mullins, and, I think, Mr. Hamilton, in regard to the original locations where they might possibly have the advantage of them in some way, and as near as I remember, they thought we would be confined to the original discoveries; in the Pleasant View there was a body of quartz uncovered at about 24 feet; I cleaned out the

(Testimony of Louis Mason.)

shaft down to probably three or four inches below the side of the quartz that was on the north side of the shaft and then afterwards parties that Mr. Kemper brought out removed more of the ore from along the side of the quartz and it did not show that it went down; it showed easterly in the vein but it did not show down. The discovery on the Point Pleasant was made east of the ground covered by the Butte and Boston placer claim, a distance of possibly a hundred and twenty-five feet; it was outside of the boundaries of the Butte and Boston placer on the Birtha ground; it was within the boundaries of the Point Pleasant location, and Mr. Passmore showed me the corners; the Point Pleasant location, as it was marked upon the ground there, overlapped the Birtha, and the discovery was within the boundaries of the Birtha claim. Referring to Defendants' Exhibit 2, in the litigation [853] of 1901, there is some testimony here in reference to shaft No. 10; I had a time-book that I referred to in giving testimony in 1891; I searched diligently last fall to find it; I got that time-book during the summer with two or three receipt-books where I had the dealings with Mr. Kemper and I tied them together and laid them in the till of my trunk, but I failed to find them just before this case started. I made several searches for them, but they seemed to have got misplaced somehow. I could not say the exact date the adverse proceedings were instituted as a result of which this settlement was made in 1895, but it was a few days after the application for placer patent; I do not

(Testimony of Louis Mason.)

think we did any work upon the ground from the time Mr. Rea left until after these adverse proceedings were instituted. I think the surveyor's name was Ray who made the survey upon the ground when these adverse proceedings were instituted; in the two adverse suits that were brought there were copies of the maps that he prepared as a portion of the pleadings in those cases.

By General NOLAN.—The original pleadings are gone, but I have got copies of those maps attached to the pleadings. They are down in my room and I will get him to identify them and introduce them in evidence.

Recross-examination.

(By Mr. SHELTON.)

The WITNESS.—I could not say exactly whether I was aware when I settled this suit that has been referred to, that if there were any known lodes then within those claims of sufficient value to justify exploitation, they were excepted from the placer ground, but I counseled with Mr. Haldorn afterwards, [854] and he said that the placer title was of but little value,—that someone sooner or later would locate the ground and you would lose your interest, he says. I told him the conditions on the ground,—that there were known lodes on the ground, which was after this settlement of the case with the Butte Land and Investment Company; I don't remember whether I knew that known lodes would be excepted at the time of the settlement. Mr. Hamilton who was interested with me in the Pleasant

(Testimony of Louis Mason.)

View was a lawyer, practicing here for some time. I do not mean to tell you that Mr. Hamilton advised me that known lodes were not excepted in the placer patent. I spoke up and I says, "These veins are open and plain to be seen and someone is liable to give us trouble over the title." He says, "No, I don't think they will." That was the conversation in regard to that. You must remember the Hornet shaft was not the discovery shaft of the Pleasant View, neither was it the discovery shaft of the Point Pleasant. I did not know that if there was a known lode in the Hornet shaft, known to exist there, prior to the date of the placer location, that that would constitute a good defense to the suit brought against me by the Butte Land and Investment Company, basing their claim on a placer location; I think you would be bound by your discovery when you made your quartz location, or your placer location. I think Mr. Passmore stated that he would be bound by the discoveries that he made; he said that about the time of the compromise I don't think he said that if there was a known lode there, we could defend as against the claims asserted by the Butte Land and Investment Company; he was at the Hornet shaft different times, and I showed Mr. Passmore the lead on the north side of the shaft, and he said it was a lead, and he said, "After you disclose the vein or get it open, [855] where you sink sufficient to show that it is a vein," he says, "then why move to somewhere else and work."

(Testimony of Louis Mason.)

Redirect Examination.

(By General NOLAN.)

The WITNESS.—When the settlement was made in 1895, we were compelled, in my opinion, to abide by the location by Passmore of the Point Pleasant and Pleasant View, and we were claiming the ground by reason of the original discoveries, the Pleasant View and the Point Pleasant; that was the claim that was being made by us people at the time that the compromise was effected.

Recross-examination.

(By Mr. SHELTON.)

The WITNESS.—The controversy in the case was an assertion of title on the part of the plaintiffs, and the defendants denied the title of the plaintiffs. The veins which I had opened up after being in the ground, or the shafts, was not in question in the court in that case, and in that compromise it was the location of the Point Pleasant and Pleasant View that Mr. Passmore made that was tried. We had to defend our rights under the locations made by Passmore.

Redirect Examination.

(By General NOLAN.)

By General NOLAN.—We will now offer in evidence Defendants' Exhibit No. 1, and if you will wait for a couple of minutes, I will go down for those two maps.

By Mr. SHELTON.—We will object to the admission in evidence of the map, upon the ground that

(Testimony of Louis Mason.)

it is immaterial and irrelevant, and further, upon the ground that as to a portion of the matters represented on the ground as it appears that they were located [856] from statements made by other persons than the surveyor who prepared the map, and that as to such matters the map is hearsay, and so, also, is all testimony relating to such portions of the map. For that reason the map is incompetent.

By the EXAMINER.—The map will be received in evidence.

The WITNESS.—The maps you call to my attention are copies of the maps that were attached to the pleadings in the original adverse suits that were brought in 1891; the survey was made by Mr. Ray, in each case, a deputy mineral surveyor; the papers you show me were used in the suit as exhibits. Judge Harney was the judge who tried that case.

By General NOLAN.—We will offer these in evidence as such portions as we can get of the original papers.

By Mr. SHELTON.—Object to them on the ground that they are incompetent, irrelevant and immaterial.

By the EXAMINER.—I will mark one of them Defendants' Exhibit 110, and the other Defendants' Exhibit 111.

(Signed before Examiner February 13, 1912.)

[857] By General NOLAN.—With that the defendants rest.

By Mr. SHELTON.—At this time the defendants having rested their case, the complainants will move

(Testimony of Louis Mason.)

to strike out all of the evidence of the defendants heretofore taken, for the reason that the same is wholly insufficient and without additional proof, it is entirely immaterial, for the reason that, first, that there has been no clear or satisfactory proof of the existence of a known vein within the ground in controversy in this case, or any part of it, at or prior to the date of the placer application; and, second, for the reason that there has been no evidence specifically defining such veins, if any were known to exist, together with the twenty-five foot strip of surface ground on each side of the same, and there is no evidence which would enable the court to render a decree describing any such vein, or such strip of enclosing ground, and within the ground in controversy in this case. The said evidence, and all of it, is immaterial and irrelevant, and is wholly insufficient; for the further reason that there is no clear or satisfactory evidence that any known vein, at the time of the placer application, was within the boundaries of the ground in controversy in this case, or within the boundaries of the Butte and Boston placer, definitely ascertained. In the event that such motion is overruled, then the testimony hereafter to be taken on the part of the complainant to be considered as offered. If the said motion is sustained, then such testimony is not to be considered as offered.

[858] Complainants' Case in Rebuttal.**[Testimony of Elliott H. Wilson, for Plaintiff.]**

ELLIOTT H. WILSON, duly called and sworn as a witness on behalf of the complainant, testified as follows:

Direct Examination.

(By Judge BOURQUIN.)

The WITNESS.—My name is Elliott H. Wilson; I am past sixty years old; my residence is Butte, Montana; I am a civil and mining engineer and have followed that since 1870; I am a graduate of Washington University of St. Louis, class of '71, civil engineering. I think it was in '84 that I actually commenced following mining engineering in Butte, when I effected a partnership with John Gillie, and I am still practicing that profession, and I have had a large experience outside of Butte as well as in it, all over the North American continent from Oxaca, 400 miles south of the City of Mexico to the Yukon; my early experiences were confined principally to mine surveys. Lately I became very much interested in ore deposits, to the extent of investing in and working in mines. I remember the litigation in the Butte District between the Amalgamated Companies and the Heinze companies, and as a mining engineer I was often called upon as a witness in the courts of Butte and elsewhere to present the physical and geological facts as I saw them in the ground which affected the ownership of valuable ore bodies. From 1886 I have been almost continuously a resident of Butte, very largely in the practice of my profession, and believe

(Testimony of Elliott H. Wilson.)

I have acquired very extensive knowledge of the mines in the Butte District, having visited almost all of the producers in the camp. As a mineral surveyor I patented a great many of the claims adjoining this ground in controversy, prior [859] to the application for patent to the Butte and Boston placer, and among others, the Copper Queen, Rising Sun, the Ella on the north, and probably the Pacific and the Bullwhacker. All those surveys were made by me in my capacity as official United States Deputy,—most of them some years prior I imagine to the survey of the Butte & Boston placer. I made the survey for patent for the Butte & Boston placer, and before that, in January, or December 20, 1890, I accompanied Mr. Kemper to this ground and pointed out the boundaries of the patented ground adjoining at which to set his location stakes, he contemplating the location of the ground. At this same time, I remember calling his attention to the fact that possibly he should cut out this strip up next to the Pacific which is now occupied by the Birtha, because of the fact that bed-rock was very near the surface, or possibly exposed there, and I satisfied myself that there was no quartz locations or openings upon quartz veins upon the ground at that time, and I think it was,—I made the patent survey for that ground on January 9, 1891. The ground in controversy is situated on what is called the east side of the district; the great majority of the producing mines of Butte, as developed, are on the west side of the district, of the Summit Valley district; there are two districts here; the Independ-

(Testimony of Elliott H. Wilson.)

ent Mining District west of Butte, which is not a copper bearing district; in a general way I recognize Silver Bow Creek as dividing the east and west districts of Butte. The occurrence on the most of the west portion of the district of the most remarkable bodies of ore that have ever been discovered, and comparatively insignificant discoveries as far as development has gone on the east side of the district in question. There is no difference in the formation in the two districts; the veins as mined and located have all been in what is termed [860] the Butte granite. I was last on the ground in controversy within the last few days and examined the various openings as they were discussed. There were not extensive openings on the Butte and Boston placer when I made the survey for patent, but as was my custom to protect all locators by giving due notice of intention to apply for patent, I located two shafts. The only ones then existing upon the ground, which I have since learned was the Point Pleasant discovery and a shaft to the east of it four and a half by six by twenty feet, which, with the exception of two insignificant little open cuts in the same portion, were the only openings in the surface; that was in January, 1891. On the Complainant's Exhibit No. 14 the Pleasant View discovery is marked. Since this hearing has opened I have visited the various openings now existing on the ground in controversy. I visited the shaft numbered 19 on Defendants' Exhibit 1 on January 19, 1912, and that shaft is sunk through wash to a depth of eighty-five feet; there was about

(Testimony of Elliott H. Wilson.)

five feet of it in bedrock, and the material exposed in the bottom of that shaft in bedrock was crushed granite, accompanying the fault movement, that is a plane of the continental fault. The material was clay, kaolin, resulting from the decomposition of the feldspars in the granite, and the various movement planes had about a north and south course, and certain ones of those places showed a considerable interior movement, accompanying with slickenslides along the clay material. I saw there a plane of the continental fault. There has been a great movement that has been known to have a width of probably two thousand feet and which has dropped this entire region an unknown distance from the top of the main range to the east of the camp, and that is known as the continental fault; I have seen the evidence of that fault in a great many places. Fifteen years ago my [861] attention was called to rather favorable surface indications of ore, and actual deposits of chrysocolla, possibly the carbonates of copper, on the Six O'Clock claim; about a mile north of this ground in controversy; as I recollect it Sam Newhouse sunk a shaft under the direction of Dick Watson to a depth of 600 feet in the belief that at some considerable depth the favorable indications of copper found on the surface would develop into a mine of consequence; that was sunk in quite a wide portion of the continental fault through the Six O'Clock claim, and the result was an entire disappointment; as I remember it, the superficial impregnation, on fault lines, along the fault lines, the limits of which were not ascer-

(Testimony of Elliott H. Wilson.)

tained in the mine workings, excepting by cross-cuts with which to determine that they had got below all mineralization at the depth, I think it was of 400 feet; this superficial showing of chrysocolla on the Six O'Clock claim was not very extensive, as I remember it, but such copper stain was thought to be an indication of good ore with some considerable depth; I also saw this chrysocolla on the Sinbad, which is probably half a mile north of this ground,—north of the Pittsmont holdings, as I remember their boundaries; that was sunk to wash to a considerable depth before bedrock was encountered. I have seen numerous specimens of copper oxide that were very flattering, from that shaft; they found no commercial deposits of copper ore there that were satisfactory; the continental fault was encountered there. There were also operations on the Sarsfield claim to the north of the Pacific, which adjoins the ground in controversy on the east, which showed such deposits of copper on the surface, which, until their character had been determined by numerous mining operations, were thought to be very attractive. I only saw some of the open cuts on the Sarsfield which disclosed north and [862] south streaks and bunches of red oxide in them; this green stain of copper or chrysocolla manifested itself to a limited extent in the Sarsfield; the ores there were principally cuprite; that is what I recollect seeing on the surface. The Amazon-Butte has a quite extensive deposit in the fault planes of the fault. Their determination as to depth has not been made fully, but ores were extracted by lessors

(Testimony of Elliott H. Wilson.)

to a depth of fifty feet, and I recollect rather diminishing values as they descended. The Amazon-Butte is possibly a half a mile to the south and east of the ground in controversy. I might state that when the Bullwacker shaft was first started, I was asked by Patsy Clark and his associates to go out and take a look at the material in the shaft, which was apparently quite flattering. It was only 20 feet deep, and the material exposed therein was largely iron stained granite. I do not recollect that I identified any of the copper minerals in any of that shallow excavation. There is a fault vein in shaft 19, but not a mineral vein; a fault vein is a displacement vein which rarely carries mineral in any commercial quantities; this fault vein in shaft 19 filled the entire width east and west at the bottom; its course is north and south; I saw no evidence of copper mineralization therein. The course of the system of regularly mineralized veins in the district of the ground in controversy is east and west. I visited what is marked tunnel 35 on Defendants' Exhibit 1 coming east from shaft 19, and I found a considerable portion was through wash. The granite at bedrock was encountered only six feet back of the present face, and rises above the sill, or bottom of that drift about two feet. There is a little cross-cut to the north five feet west of the face which shows aplite. The other exposures of the face of the work and portions of the north drift show granite. Aplite is a [863] dyke material which has filled fissures and is a compound of feldspar and quartz and vary rarely some of the

(Testimony of Elliott H. Wilson.)

mica constituents present. It was called in early controversies in this camp granulite, and was in fact in a discussion of ownership of ore bodies between the Lexington Mining Company and the B. & B. many years ago when it was first generally recognized as a dyke material. It is very rarely a material that carries minerals of value in the Butte District; there have been some few exceptions. The fissures intersecting are aplite dyke have impregnated the aplite to a limited extent. That is in the Nipper lode, north of the Parrot, in the western portion of the district; I saw no evidence of a vein mineralization in tunnel 35. I entered tunnel 36, marked on Defendants' Exhibit 1; after going through a considerable depth of wash, we entered a granite and aplite intermingling, which continued to the face of the main tunnel. There is a branch easterly and a cross-cut northeasterly, near the face, and I saw nothing but aplite material in the southeast prong of tunnel 36, which miners call a water formation, consisting of a hydrated, silicious material, but no evidences there of any mineral. I saw no evidence of mineral in that tunnel; I suppose it was twenty feet below the bedrock, possibly and I saw no evidence of a vein or ledge in that tunnel, unless aplite would be called a vein; in speaking of that matter I would say that aplite filling a fissure may sometimes be called a vein, but in no sense a mineral vein. I did not enter tunnel 37, marked on Defendants' Exhibit 1. I visited tunnel 34,—the Mullins tunnel, and after entering the bedrock some short distance, we encountered a fissure vein, shown

(Testimony of Elliott H. Wilson.)

in Complainant's Exhibit No. 15, which I identify roughly as being correctly portrayed therein, from approximate observations made by myself, that that vein carries ore, largely cuprite with chrysocolla [864] and occasionally in. That vein is visible in the Hornet or Mullins tunnel,—I should judge from this distance where that red vein is portrayed, it would be about eight inches by a scale to the face, and would be about two hundred and sixty feet in length; it is visible to the face of the tunnel; the walls of the vein in the Mullins or Hornet tunnel were easily recognizable and showed some little gouge in places, and were extremely well-defined, both the foot and the hanging, and were composed of granite generally, but occasionally showing aplite. I also visited the upper cross leading from the Mullins tunnel south to the Gulf discovery and the Hornet discovery; I made a very critical examination of that, and as shown on the map before referred to as correctly represented, there is a plane or a fault fissure with a strike of north ten east, as I observe recorded here, verified approximately by myself, and others, and a dip to the east of seventy degrees. The little plane of the main fissure has a width probably of five to eight inches, filled with clayey material with which chrysocolla has been deposited and occasionally cuprite bunches. That continues to the Hornet shaft. I could not identify its continuation past the south side of the Hornet shaft, for there the mineralization disappears to the east of it,—continued, and the cross-cut to the southwest was continued to the Hornet discovery. The

(Testimony of Elliott H. Wilson.)

first shaft I mentioned is the Gulf, I believe, and the second one the Hornet; between the Hornet shaft and the Gulf discovery there is granite noted and occasional bunches of cuprite; I traced that fault south of the Gulf shaft, where it disappeared in the wall; the material in that upper cross-cut between the Gulf and the Hornet shaft was granite, country rock, and there were bunches of cuprite, disconnected bunches generally, were observable on one side or the other, and that [865] material was very slightly impregnated with chrysocolla, excepting along the fault plane. Before the fault I referred to there was one encountered some little distance to the east in the main Mullins tunnel, to the west in the main Mullins tunnel, with a strike of north ten degrees west, and a dip to the east of about vertical. Evidences of that fault but slightly mineralized continue or are seen in the cross-cut between the Gulf discovery and the Hornet discovery. I went in the Gulf or Hornet discovery,—the southern most shaft on that cross-cut and made a critical examination of that, and in the Hornet discovery shaft I found down about at the back of the little cross-cut leading from the Hornet shaft into the Gulf shaft some flat lying seam, bearing both chrysocolla and cuprite; that was about at the elevation or immediately above it, of the back of the cross-cut connecting the two shafts,—that is the upper cross-cut; that seam was a couple of inches, I believe, and was a few feet, apparently, below bed-rock; it is not a vein within my idea of what a vein's requirements would be; it is probably a mineraliza-

(Testimony of Elliott H. Wilson.)

tion in the joint plane of the granite at that place, and the enclosing material was granite; I saw no evidence of that flat lying seam in the upper cross-cut itself; it appeared on the south side of the Hornet shaft, possibly more strongly than on the north side. There was the descent of another working in the Hornet shaft, situated twelve feet below the floor of this connecting cross-cut referred to; it was presumably at the bottom of the Hornet discovery shaft; the material in the shaft between those two cross-cuts was granite, and the mineralization was very slight,—cuprite in bunches; there is a stain in the country rock there. I found clear to the bottom from the upper Hornet shaft in granite country rock. I also visited the little drift southwest at the [860] bottom of the shaft, in which there was an aplite dyke exposed, uncovered and pointed out to me by the locator of this claim who, at the date of location, believed it was a quartz lode. The little short projecting drift at the bottom is what I mentioned when I referred to the point of discovery of the Hornet lode; it is in a cross-cut above that, running southwest, that I was shown this aplite dyke. I visited it on two different occasions, and I do not find any note of my observations at that point. There is a cross-cut running northeasterly from the bottom of the Hornet shaft to the raise under the tunnel, which I examined, and the material exposed there is granite; there is an occasional bunch of cuprite in the granite, some slight chrysocolla, evidence of chrysocolla staining, and notably, about one half the distance in that cross-cut, a north dipping seam seen

(Testimony of Elliott H. Wilson.)

on the right hand side, going from the shaft toward the vein, showing a visibly colored streak of cuprite, a part of the way along the east side of this cross-cut of the working; if that was continued on its course southerly it would not intersect the Hornet shaft; in fact, it is only mentioned because it is the only marked mineralization shown in the cross-cut until the vein is reached, and that has no significance, for it don't appear in any matter on the opposite side of the cross-cut. It is simply a streak on a portion of that cross-cut. I examined the vein disclosed in the Hornet tunnel clear to the face of the tunnel, and it was the only pronounced, positive vein disclosed within this area; the vein dips sharply to the south and the working in the face discloses clearly the foot-wall of that vein, being in the vein north of the small streak constituting the vein in the face; the width of the vein in the face of the Mullins tunnel is about 5 or 8 inches. [867] The vein in the Mullins tunnel between the Mullins winze and the cross-cut running south to the Gulf shaft, both walls are clearly exposed, both foot and hanging; I examined the workings on the northerly vein on the Butte and Boston placer, and I examined the working termed shaft No. 3 on Complainant's Exhibit 14, and shaft No. 9 on Defendants' Exhibit 1, and I entered the cross-cut running north from about 25 feet down in that shaft; I measured the distance from the inside set of these timbers of four feet, on the east side of that cross-cut, and there it encountered a hanging-wall of two small streaks in the granite. The hanging-wall was

(Testimony of Elliott H. Wilson.)

north, vertically, of those streaks; it was so nearly vertical that I made no note of its dip, so it was the south wall. Those streaks as I recollect were 3 or 4 inches wide, each one separated by about a foot, as I remember it. I made two visits to this working, and a few days since managed to get in and see the east face of that shaft, where the lagging had been taken out, down between four and five sets below the collar, and there was no evidence of any vein whatever shown in the east side of that working. I visited tunnel 31, on what is termed the north vein, and the vein was disclosed in the cross-cut north,—the first cross-cut north, after entering the tunnel, and 20 feet north of the main drift; there was disclosed a streak 8 or 10 inches wide, possibly, and it had an appearance of a vein, and probably would fill the definition that is accepted as a vein. It had mineral, chrysocolla, in an apparently aplite fracture, with a definite course of north 80 degrees east; on my first visit, that was the then face of the cross-cut. On a subsequent visit, perhaps 10 feet farther advanced toward the north, was another streak of similar material 8 or 10 inches wide. The continuation of the main working encountered the vein 40 feet beyond the cross-cut previously mentioned, [868] and ran along it for a limited distance; that was on the left hand side of the tunnel, going easterly, and then was encountered a vertical fault with a course north 15 to 20 degrees west, probably,—a plating of the continental fault; that fault absolutely terminated the vein at that plane; and east of the fault there was no ore

(Testimony of Elliott H. Wilson.)

disclosed until another fault was encountered and alongside of that was evidences of a slight mineralization in spots; that was a fault near the face, and in which the face of the working terminates, and is indicated by the line across the face of the little north cross-cut, near the face of tunnel 31, on Complainant's Exhibit 17; the mineralization, as I remember it, was back about 15 feet from the face, in a hole shot in the fault, and in the north wall of the working,—the north side of the working; that hole is also indicated near the face of tunnel 31 on Complainant's Exhibit 17. I also visited shaft 2 as it is marked on the exhibit here, west of tunnel 31, and also shaft 1. In shaft 2 I found 5 or 6 feet, possibly, of the bottom of that shaft had penetrated into the country rock; on the north side and west side, there was massive aplite; on the south side of the shaft was disintegrated, soft granite; the north side, in fact the aplite approached near the surface, as I remember, probably some distance above the noted five six feet which the shaft penetrated the bedrock. The aplite appeared there in the form of an unmineralized dyke, slightly iron stained; there is no cropping of a mineralized vein or ore in that shaft at all. I visited both these shafts on two different occasions, and thought I had fuller notes, but my recollection is quite clear. There is 5 or 6 feet of the bottom of that shaft was in bedrock,—penetrated bedrock below the wash,—and all of the material in the bottom I regard as [869] granite; there was a six inch streak of segregated, silicified granite; it possi-

(Testimony of Elliott H. Wilson.)

bly may be aplite; the distinction between aplite and highly silicified granite is very slight. They both are composed of silica and feldspar; this six inch band of alleged vein quartz was in my opinion, a silicified segregation of granite. I would call it hard or highly silicified granite,—granite segregation; in that connection I will state that these occurrences are not infrequent; they can be seen in any of these weather worn and massive boulder districts, where such ribs of silicified material appear through the mass of the boulders; that deposition, and segregated from that molten mass from which the granite is supposed to have come up, is also to be seen frequently in cases on the surface and has excited considerable comment, being masses of very dark material, probably a segregation of the hornblende; there is no exposure of a vein or quartz of mineral bearing rock in shaft No. 1. I visited what is marked Vesuvius discovery on Defendants' Exhibit 1; I do not recollect those workings being there when I surveyed the Butte and Boston placer. The portion of the ground I recommended to Mr. Kemper to leave out was the portion probably called the Birtha; that was then presumably unlocated territory,—a triangle lying east of the Pacific, and south of the Copper Queen and northwest of the Bullwhacker. I might as well state here that, representing the Government in a nature as well as my clients, my advice,—and the Government being anxious to sell a lot of this land under the law,—my clients were often anxious to acquire title which was difficult to get under the mineral laws. I visited the

(Testimony of Elliott H. Wilson.)

Vesuvius shaft on January 14 of the present year, and examined the north and south workings from that shaft; one of them was a cross-cut going south from this shaft [870] a distance of 25 feet; there it encounters a green stained wall, which was followed easterly for 25 feet; near the east end has been, apparently, a recent extension of the cross-cut farther south; in this cross-cut that I last mentioned, five feet south from the drift east, a little vein of joint filling mineralization is found, and probably contained an inch to a half inch of chrysocolla, seen on both sides of that cross-cut, down to within a foot or two feet of the bottom of the working, where it terminates against an unmineralized joint slip. I would classify it as a joint plane. That is not the same mineralization that appeared farther west in the cross-cut running east, from which this little cross has been newly done. The first mineral that I speak of as being encountered was along a fault and carrying copper, or joint, running easterly and westerly; that appeared in the right-hand side, going east, of the working described, running easterly in the cross-cut. I saw no other evidence of mineralization in that southern cross-cut than I have mentioned, excepting the staining of the country rock a slight greenish color; the country rock was granite and the other silica and copper. The north cross-cut from the Vesuvius shaft is 68 feet in length; it runs at 39 feet, apparently, joins east and west, is encountered, which has unappreciable width and is iron-stained granite. Thirty feet from the shaft is also an unmineralized, very

(Testimony of Elliott H. Wilson.)

slightly stained joint. Fifty-three feet, I have marked, is an insignificant joint seam; the course generally is east and west; I made no observation, excepting it was practically at right angles to the cross-cut, which was north and south; the country rock of that north cross-cut was granite entirely, with no appreciable evidence of mineralization; not so noticeable as it is in the south cross-cut, where there is a very noticeable stain in the [871] country rock, with copper. I also visited the shaft marked 21 on Defendants' Exhibit 1, west of shafts 1 and 2; it is said to be about 110 feet deep; I thought it was a great deal deeper after I climbed out of it; that shaft has penetrated the bedrock, after going through the wash, to a possible depth of two or three feet, and the west side of that shaft was crushed granite, clayey mass, somewhat kaolinized. On the east side, it was also a crushed granite, which had apparent directions of running north and south, with a dip seventy-five to eighty degrees to the east and being undoubtedly, in my opinion, a plating of the continental fault. The most noticeable line of fracture to me was on the east side; I took a direction there practically northerly and southerly; there were other directions possibly, disclosed in the west side that were a little more northwesterly, and there were immediately below the surface of the bedrock,—there seemed to have been a cross-fracture between such seams more nearly horizontal, in which some rather marked mineralization,—iron stain, were quite red; that was very near the surface below the wash on the west side of

(Testimony of Elliott H. Wilson.)

the shaft; that was nearly a horizontal fracture; this fracture on the east side of the shaft crossed the shaft north and south very distinctly and in my judgment was the plating of the fault; I did not see anything I regarded as a vein. I also visited tunnel No. 30, so marked on Defendants' Exhibit 1, just north and east of the deep shaft I have been describing; I entered through the tunnel from a hole caved in the top, and in possibly 140 feet from the mouth of that tunnel was a cross-cut to the south, which was entered immediately after getting out of the wash through which the tunnel had been driven approaching it. That cross-cut running south, ten degrees east, was entirely in aplite and the aplite showed strains that had been made east and west [872] fractures, rather noticeably,—unusually so for that portion of the district; they were not mineralized. On further was encountered, oh, possibly 20 feet further, was encountered the plating in the continental fault and the cross-cut was driven northerly along that for a distance of about 20 feet. That disclosed, as I recall it, altogether aplite. They have driven the cross-cut northerly along that fault; I have the course of that fault marked north 10 degrees east here.

I have also visited the Rabbit discovery, marked on Defendants' Exhibit 1 and Complainant's Exhibit 14, and I observed a little offset, like the beginning of a drift in the bottom of it, probably a foot and a half or two feet westerly. I found this shaft, in the bottom, has been generally in granite. I have not recorded whether massive aplite, but there were two

(Testimony of Elliott H. Wilson.)

little seams in the west face of the little working that I have described, running west from the bottom of the shaft, a foot and a half to two feet, which was slightly stained,—copper stained aplite; we left the vein,—a vein very insignificant for the course of that extended easterly; the course of these little seams of aplite extended easterly, showed no evidence whatever in the bottom of the shaft or on the east or south side of the shaft, where it should have been if it had any significance at all,—it should have been seen,—so it must be regarded that these things are simply bunches of aplite within the granite mass, which is very frequent. I did not observe any green chrysocolla staining in the Rabbit discovery shaft itself. In tunnel 31 I observed no such remarkable staining as was visible in the Vesuvius workings; there was no such staining of the country rock generally, but there was a little streak in that southerly cross-cut, as I remember it, which showed some [873] chrysocolla staining along apparently the fracture line in the granite.

Cross-examination.

(By General NOLAN.)

The WITNESS.—I graduated from Washington University in 1871. I came to Montana ten or twelve years prior to my acquaintanceship with geology—then I observed in a layman's fashion, a great many mineral deposits in this country, such, for example, as the placers at Pioneer, and the marble exposure west of Helena, incidentally through the course of my work as a civil engineer; my acquaintance with

(Testimony of Elliott H. Wilson.)

mines, however, in a professional capacity, was subsequent to that time, and in the years I have mentioned from 1884; and in the year preceding I made that estimate of which I spoke yesterday as to the bodies of ore uncovered in the Anaconda and St. Lawrence mines; that was done at Mr. Daly's request, to accommodate a man whose acquaintance I had made; it was done simply with relation to the reluctance which this gentleman manifested towards building a railroad; he wanted to be satisfied that the ore deposits were such that there would be some permanency to the shipment of the ores. During the period I occupied the position of United States Deputy Mineral Surveyor I was not permitted under the practice of the Department, to locate mining claims; I located many for others, but never during that period any for myself, and I do not recall that I ever attached my name to any location notice for ground that I was interested in. I was appointed Deputy United States Mineral Surveyor in 1883 or '84. It was the year subsequent to the completion of the Northern Pacific Railroad. I don't know whether my name still appears as United States Deputy Mineral Surveyor; I regarded my work as such had ceased, and I [874] presume that it would be canceled unless work were received. No orders have issued to me for patent surveys for fifteen years. As a man with some knowledge of what was required and by reason of the knowledge that I was supposed to have acquired of what constituted a proper location, I have been employed frequently to make loca-

(Testimony of Elliott H. Wilson.)

tions for companies and individuals, that would be legal. Many of the mines in this district now being worked were located by my advice. A good many mines have been located in this district since I came here that are recognized as mines, but comparatively few of the total number of operating mines have been located since I came here. A notable exception is the development north of the Speculator,—of the North Butte properties, which were considered of very little value when I reached here, and many of which were located subsequent to the time I came here. I cannot give you the name of a mine in Butte that I located myself. In explanation if I may, except examination of areas that had been previously located frequently disclosed or proved to me that the locations were invalid and at my advice many amended locations were made, which made proper changes of boundaries in relation to veins, which would show legal discoveries. All that is true in much of the region that is now being worked north of the Speculator. In the practice of my profession I have been called to examine properties all the way from Mexico on the south to the Yukon on the north, and I have made a great many reports upon mining properties,—I was not invariably correct in the estimates that I made as to the mineral conditions in all of the reports. I have never yet passed upon a property unfavorably in all these years, that has since proved that my estimate was very much of a mistake. I remember of no instance where complaint has been made that my prediction did not comport with the

(Testimony of Elliott H. Wilson.)

facts. I only made [875] a report on this property in controversy in my official capacity as United States Deputy Mineral Surveyor, to the Surveyor General.

Q. That is to say, you reported, in your judgment, this ground was valuable for placer purposes.

By Judge BOURQUIN.—We object to that as not the best evidence. These reports, whatever they are, are made in writing and hence should be produced by certified copy. Incompetent.

A. I made such a report and I re-perused the report in my own handwriting in the office of Barker and Wilson some days since, in which I made such report which was then required before the Government patented land.

The WITNESS.—I was required as Deputy Mineral Surveyor to make a superficial, perfunctory examination; I did not pan any material from that ground, and did not see it panned; I based my report upon the location notice and never examined the ground as an expert; just made a perfunctory report. I don't know anything about the application being rejected because there was not a declaratory or declaration that there were no mineral leads known to exist on the ground; I remember nothing concerning the litigation following this, and was not concerned in it at all, because if there had been a mineral vein disclosed in that property when I made that examination, I should have shown it on my plat. I regarded my obligations as a deputy mineral surveyor,—my duty both to the general public,—as requiring

(Testimony of Elliott H. Wilson.)

that and for the reason I showed the only workings on the ground that were of any consequence which might have disclosed such a vein, and there was no such a vein in those workings. Any report I might have made as to the placer mineralization was not based upon any examination that I made personally; I observed the claims in the certified copy of the [876] notice posted on the ground. And further, observing that that location notice claimed the placer as for clay as well as gold. I knew that in that region,—in any region in the country,—that you can make a placer deposit upon any bed of clay that you can find, that will be perfectly valid if there is not a particle of gold,—I meant a placer location on clay.

Q. Don't you know that as a matter of fact, there was a rejection of this application in the first instance because the ground could not be located by reason of any clay deposit that it had?

By Judge BOURQUIN.—Objected to as incompetent in that, first, it assumes a fact not yet shown to exist, and second, that if there is any such rejection it is of record and any writing of record and in writing, and this is not the best evidence.

A. I know nothing about that matter,—the rejection,—I heard nothing further about that,—nothing further of the history of the claim after the date of my survey.

Q. Well, in connection with the report that you did make, did you certify that it was valuable by reason of the clay or by reason of the placer gold which it contained?

(Testimony of Elliott H. Wilson.)

By Judge BOURQUIN.—Like objection.

A. Possibly both. I am not sure that I mentioned clay in that report as being one of the valuable minerals that were disclosed. There is such clay, I know now, to exist upon this ground, especially in the bottoms of shafts 19 and 21.

The WITNESS.—That is this kaolin that I spoke of; these disclosures, of course, did not exist at the time I made the report; there were surface indications that came to my knowledge showing the existence of kaolin; there were banks of a stream just south of it. The Columbia Gardens canyon showed clay [877] deposits, and I don't know whether at that time or subsequently those deposits were actually worked and bricks burned upon that ground, within a quarter of a mile of this claim; the kaolin exists there within the walls of a fault fissure. The clays, as disclosed, and of which bricks were made were the result of wash material down through the pronounced channels; veins and vein fissures are both veins, both having walls, and both presumably furnishing a space to be filled up with some kind of material. In the case of a fissure running east and west and in the case of a fault running north and south, you simply have fissures in both cases, and these fissures have walls in both instances, and there is no difference in those particulars between the vein fissure and the fault fissure; the difference consists in the material that fills the fissures; in the case of a vein fissure it is worthy of consideration; it is metalliferous matter and quartz, principally vein matter, and if it is

(Testimony of Elliott H. Wilson.)

worthy of consideration it is mineral of commercial value; if the quartz is mineralized it becomes a mineral vein; in most instances in the case of a vein fissure, or in the case of a fault fissure, if you have the fissure running through granite the filling is granite, and if you have the fissure going through aplite the filling in part is aplite; I have seen such occasions where that country rock has been entirely removed and the fissure was entirely filled with quartz. There are a great many speculations as to how the quartz got in this space to fill it up, but as it is generally accepted, it came from below from solutions emanating from great depths. Quartz in itself is simply quartz; the minerals deposited, accompanies the deposition of quartz. We have a fissure occurring in the granite. You get the quartz to fill the unoccupied space between the walls from aqueous intrusions from great depths [878] below, that has come up in solution,—silica has come up in solution, cools slowly and is deposited as crystals, constituting the quartz filling of the fissures; when the silica comes up this mineralizing stuff comes up at the same time practically; that period may have covered years and the exact way these were deposited in the veins is a vexed matter that I do not have enough original knowledge of. It is a matter of speculation by all geologists, who possibly differ, but it is generally accepted that all the quartz filling of the fissure is as I described it. I do not just recall any mine in Butte where the vein is all quartz or silicon, enriched where we have the mineral claims with those enriching faults through its

(Testimony of Elliott H. Wilson.)

entire length. I have in mind one of the original that has a very pronounced quartz outcrop, which is the Colusa lode which, in part I believe, has an entire vein filling in places,—or quartz filling; that is one of the original master lodes of the entire district. I did not say that throughout its entire length and strike the filling is exclusively quartz; I say in certain observed sections it was quartz; I don't know what it might be on the strike or dip; I have seen it in cross-cuts where it was entirely of quartz; the width of the quartz disclosed there I think was five to eight feet, but I noted it a great many years ago; I would say that it was very unlikely that the material in that lead is all quartz; I account for the other material getting into that fissure besides the quartz by the grinding up of the material of the country rock by the movement of the walls of the fissure. I know of instances in this region where the vein material is altered granite and is treated as ore; I do not think that the granite got into the fissure there so as to be subjected to the action of the enriching fluid by reason of the movement of the walls of the [879] fissure; I will state how I do believe that this peculiar condition exists here. The Butte mineral deposit has been brought about at various times at several marked periods of deposition, that followed marked volcanic activity. There are no less, probably, then three distinct periods of that sort, and the result has been a crushing of masses of granite adjoining veins of possibly, certainly of an origin prior to the volcanic movement mentioned, and solutions following such violent actions have pen-

(Testimony of Elliott H. Wilson.)

etrated the mass of interlaced parallel veins, or veinlets, and produced a very peculiar condition that has made very considerable blocks of ground profitable ore. I have observed that condition in numerous places. Where the fissure goes through the aplite there is, to a limited extent, this grinding and this breaking up of the aplite mass, and a dumping of it into the fissure, but aplite is such a hard material that it takes some very violent action to break it up at all; it usually maintains its identity in this soft granite as a dyke material hard as an iron stovelid. If the vein is worthy of consideration we have the metals generally in sulphide form. In the case of granite or aplite in the vein, subjected to the influence of the vein solutions, the aplite experiences a slight change and the granite quite markedly, and I would state the apparent reason. The alkaline solutions can attack the mineral,—iron mineral, especially, easily in the granite. The iron materials being varieties of the mica family, and the mica,—it is almost entirely wanting in the aplite; and in the case of granite you have the iron exclusively in the mica,—it is in this camp especially. There are scattered through the granite mass minute particles of iron pyrite. That iron pyrite is sometimes, and very often, a portion of the metallic filling of the original [880] veins; in the case of aplite you have no mica at all and you have not any of these iron pyrites that could be attacked by the alkaline solutions. Regarding why you sometimes have the aplite so impregnated with mineral as to make it ore, my opinion is, from observation of the

(Testimony of Elliott H. Wilson.)

result of shearing traces in masses of aplite, that they have open planes, which might be solutions,—that might admit solutions which would subsequently be deposited; with the shearing you would cut lines of cleavage; it is the aplite that remains within the boundaries of the aplite, to a degree crushed and opened, and within it deposited generally these superficial ore deposits; if there was any mineralization it would be on the surface where it was exposed to some plane movement, and that was imparted to various materials within the boundaries of your aplite fracture and the whole mass of broken material would be quoted in this instance we are discussing, chrysocolla or cuprite deposit. Defendants' Exhibit 81 is seemingly a piece of aplite; there is no evidence of mineralization in it that I can detect with the naked eye. Defendants' Exhibit 79 is aplite or is very highly silicified granite. This piece is more glassy, and the other had apparently more feldspar, which is one of the constituents of aplite; this piece seems to have some iron mineralization. (Three pieces being Exhibit 79.) The mineral is shown on this in the faces, and so forth, and were certainly deposited from a mineral solution; it is quartz, but not vein matter. In some cases you find vein matter, not necessarily quartz; I make the distinction in this instance because this is largely quartz. I hesitate to say that is vein matter, even if found within a fissure, within walls,—because the quartz fissure of the fissure vein is quartz crystals, which have a very distinct appearance from a [881] silica or quartz that is so com-

(Testimony of Elliott H. Wilson.)

mon through general country rock, and that distinction is made from the fact that all the quartz in the quartz fissures, such as are known in Butte, are of crystalline character, and the authorities who have investigated the matter state that it is greatly different in specific gravity from the silica and masses outside. No matter how highly mineralized the material is, unless it is quartz and possesses this crystalline texture it is not vein matter in my judgment; the character of the quartz and feldspar resulting from the decomposition of the irons within it, that might be vein matter. I have in mind the residue of the crushed granite that might be classed as vein matter in many of these replacement veins such as I have observed in the Minnie Healy, in which considerable crushed quartz and remains of the quartz material of the granite is still in existence. I testified in the Nipper case. I do not recollect whether the controversy there was whether or not the vein material,—aplite,—would constitute a vein. I know, as a matter of fact, that the contention was the crossing through of an aplite material in a raise which showed aplite in the center and good copper bearing-mineral on both sides, and which was in the fissure, but as I recollect it, that aplite was cut by that fissure, and was very slightly mineralized as compared with the vein on either side; I recollect that I testified and I recollect this occurrence distinctly, of aplite between the walls of that vein, which had been a dyke undoubtedly, and been cut by the fissures; the aplite within the walls was very slightly mineralized; I imagine the

(Testimony of Elliott H. Wilson.)

aplite was taken out of that raise, shipped as ore, because it contained one per cent of copper, whereas the material on either side was from five to seven per cent of copper; that is the only instance I know of in Butte where aplite was treated as ore,—in that [882] raise, which was of very insignificant extent; I do not recall any instance in the copper bearing portion of the district where the vein passes through an aplite formation the aplite has been mined and shipped as ore; in passing from the vein fissure to the fault fissure, the filling sometimes becomes ore, more generally fault fissures are unmineralized. In a fault fissure there is not any vein quartz; I will make a distinction between vein quartz and quartz residue from the disintegration of granite and other rocks; vein quartz would be the quartz deposited from aqueous solutions, very slowly, within the walls of a fissure, forming crystals which the authorities state has considerably greater specific gravity than the silica. The fault quartz is the residue in this district of the granite element quartz. Vein quartz has nothing to do with the granite, and, generally speaking, the fault quartz is simply a disintegration of the granite by the removal of the feldspars in part, and the mica material very generally. There are fracture planes usually in the mineralized material in a fault; I do not think they get down as deep as the vein fissures,—they may possibly,—possibly deeper; I know of some very great extent which may have gone deeper than the metalliferous veins; they were in this district,—the east and west veins,—such as the

(Testimony of Elliott H. Wilson.)

Anaconda and Syndicate veins,—were probably the original fissures. They were subsequently cut by northwesterly veins or fissures. Some people refer to them, because of the amount of gouge, as faults. They were generally mineralized. The blue vein is one such, and there is a parallel system of veins through the camp that have been developed, the northernmost one of any consequence, being the Jessie, and the Edith May veins of the North Butte. There is an intermediate one, I [883] believe, in the neighborhood of the Mountain View, which is mineralized. Now, the fault veins, the next great period of dislocation and eruption, was a system of fissures that are parallel and most pronounced within the Rarus, which are named and recognized as the Rarus faults. They have original minerals in them, only very sparsely. The ore found within their boundaries is generally brecciated, and if there has been any deposition of mineral, it has been from leaching from surrounding veins by subsequent movement. The vein fissure probably was open,—the fault fissure was not open, usually; in one instance I have mineralized material accompanying quartz; if there is mineral within the fault fissure that is deposited, it constituted a vein as well as the fissure; if you have the mineral in the vein it becomes a commercial vein, which is the only thing of consequence; it is not absolutely necessary in order to constitute a mineral vein, that it should be quartz with this crystalline texture mineralized. I made a report on the Amazon-Butte; that was not a location on this con-

(Testimony of Elliott H. Wilson.)

tinental fault; the continental fault crosses the vein upon which the Amazon-Butte relied for value in its development, and the continental fault has, in its platings, where it crosses in the neighborhood of the east and west vein of the Amazon-Butte, crossing north and south,—has this same cuprite and chrysocola deposited, which was mined quite extensively by leasers of the company, of which I was a director. I reported favorably upon the mine, because of the existence of an east and west fissure, which I regarded as being the only ones of consequence on that side of the valley, and which have been proven such by a great many developments, of which I have general and personal knowledge.

[884] I did not tell them in the report that these values would disappear at a depth of about 50 feet, but we proceeded to sink a deep shaft and disregarded, in our expenditure for the company, all of these surface indications as of value, which we allowed to go to leasers and be shipped at their risk; there was an east and west fissure in the lead we encountered on the surface, that showed generally a leaching condition, as I recall it; I don't know the definite extent of the material that filled the fissure, it was so broken there, but below the filling has shown in the two hundred and four hundred levels and was absolutely commercial copper sulphide; it was decomposed granite and ribbons of quartz, and associated sulphide minerals; in this district we have quartz commingled with crushed quartz, and with aplite very sparingly. There is this distinction between the vein

(Testimony of Elliott H. Wilson.)

fissure and the fault fissure; in the one case you must have this quartz,—crystalline quartz; in the other instance, in the fault fissure, you have this decomposed granite; that is the difference. The vein fissure, as observed here, has been accompanied with commercial ore, sulphide in depth, and the fault fissures, excepting in the case of the blue vein northwest fissure, has no original ores in it. The Rarus fault fissure has very little, or no original ores, and that was deposited, probably, that small amount, but the solutions from surrounding vein decomposition that was subsequent to the formation of the fault. The fault itself has displaced these veins, and in that respect the blue vein and the Rarus veins are fault veins. In the vein fissure you have mineralized material so as to constitute commercial ore, and generally in the case of a fault fissure, there is wanting that mineralized material; the Birtha was a fault fissure, out in the neighborhood of this ground, but that is along fault planes, but the ore is only [885] superficial and it corresponds in no sense with what we regard as vein fissures in this side of the camp. The Sarsfield, I think, was located about on the strike of some of those claims of that quartz and a very limited amount of ore was shipped from there; I would not have known anything about it, even at the time that location was made I would not have thought but that it would develop into a valuable mine at the time of its location. Since my experience in those deposits,—since I have come to the conclusion that I would not recommend the development of any location of that

(Testimony of Elliott H. Wilson.)

sort; I did not say yesterday that the Amazon-Butte was located on the continental fault; with respect to the Pacific, my recollection is that the ore occurrences, which constituted its discovery, was along the fault planes of the continental fault themselves; that is true, as far as my recollection goes, of the Sarsfield; they were northerly and southerly. The Amazon lode is an east and west lode, but incidentally there is some mineralization in the fault, in the platings of the fault that crossed that vein. I only know the surface workings of the Sarsfield; I was excited by the exhibition of some cuprite specimens a great many years ago, and I went over there and saw some of the little open cuts, which disclosed bunches and stringers of cuprite; these cuts were on the fault itself, and I think within the boundaries of the fault; I have no knowledge of what depth they went to in the Sarsfield; I know nothing of it excepting that somebody sunk a shaft to some little depth below the surface openings that I saw. I don't know why operations ceased on the Sarsfield; from information and belief it was from the playing out of the values as they descended, but I do not know at what depth. From the mineralized conditions on the surface of the Sarsfield I would have located that as a mineral claim; I should have done [886] so at that time; it is not absolutely necessary to have quartz with crystalline texture to locate a mineral claim; I did not know then that it was a fault; this fault system has been developed by very extensive work since then. It must have been along in 1888, as near as I can re-

(Testimony of Elliott H. Wilson.)

member, when I saw these cuprites on the Sarsfield; at which time this fault system was not generally recognized, and at that time not knowing anything of this fault system I would call that a mineralized vein. I knew about faults, of course, before I came to Butte, which was brought to my knowledge in the study of elementary geology; if we find a fault fissure, known to be such, that contains mineral filling, it would be a vein no doubt, and it would be a vein of consequence, and worthy of consideration only if it had commercial ore within this filling; we cannot tell at the surface how deep it is, and we cannot tell to what extent in depth these mineralizing waters carry value except by locating the ground and going after them; that work has been done in a great many places along that general line. The continental fault has been explored pretty well within recent years; it is an immense succession of parallel fissures; I do not call the continental fault all of those fissures I find here in Butte; the fissures I find in Butte, mineral-bearing veins, are easterly and westerly veins; the north and south fissures are the fault fissures, unmineralized, generally, and in this case of the continental fault unmineralized entirely at depth. The continental fault is not a term applied to all of the fissures running north and south and intersecting the veins running east and west. The continental fault as known to me is a succession of fault planes which has stepped down the country to the east, dropped it to the west, and which has an extent in places of no less than [887] two thousand feet in width, and probably its limit on the

(Testimony of Elliott H. Wilson.)

east is in the neighborhood of the Pittsmont shaft,—the limits on the west; the limits on the east are not known to me exactly. I have always thought, as Sam Barker has testified, that probably the Lily was about the easternmost exposure of the continental fault proper. I owned the ground,—an interest,—to the east of that, and until some exploration was made beneath the surface, I did not recognize the Gossan or iron cap as being a portion of the continental fault on the Lily; I have seen plates of that fault for many years, as I recited yesterday, away to the north on the Six O’Clock, where a great deal of money was spent by Sam Newhouse, to develop ore bodies beneath this rather favorable surface showing, and in the extreme south, some work was prosecuted by some eastern people five or six years ago, south of the Amazon-Butte, in the hope that the east and west fissures, where cut by this continental fault, might show mineralization, that is similar to the large mineralization; the continental fault is a number of fissures approximately parallel. I think the western limit where this continental fault would exist would be in the locality of the Pittsmont ground,—that is only from information, I am not acquainted with the facts. The Rarus fault runs northerly and southerly and it has nothing to do with the continental fault; I would regard that easterly of that point. There was a fissure showing up at the Six O’Clock claim; my recollection is rather hazy about that; I think that the cross-cuts showed broken material entirely through the lower workings, with a possible width

(Testimony of Elliott H. Wilson.)

east and west of two or three hundred feet. That is my recollection. I don't know how many of the fissures have a width approximating that in this continental fault; and I do not even know that that was one fissure that might have been a succession of several [888] fissures in the Six O'Clock that may have been just stepped down,—numerous fissures and fractures near the vein, pretty well defined limits. The veins, as contradistinguished from the fissures, have an easterly and westerly strike in this district, and the continental fault fissure has a northerly and southerly strike; there are many fissures outside of the limits of the continental fault fissure boundary that have a strike different from the continental fault fissure,—that is, on the hill; they are known to be fault fissures because they have actually faulted the original vein; they are known, and subsequent volcanic activity has brought new solutions to the surface, and as in the case of the Blue vein and the parallel veins which constitute the North Butte, there has been a later deposit of mineral, which has made those fault planes mineral veins. In the case of the development of the continental fault fissures there is mineralization to some depth, and then there is a ceasing of it, showing that the mineral is simply superficial and coming from deposits from surface waters; the surface ores there have been shipped; we shipped some from the Amazon, but knowing the result of extensive development elsewhere, in the portion of our property we spent no money in undertaking to develop those fault fissures showing mineral at

(Testimony of Elliott H. Wilson.)

the surface, at depth; there are barren zones in many of the veins on the hill,—rather lower; they are principally at the intersection of the various dyke materials by the vein, which in many cases has cut those earlier dyke materials, and have the dyke material lacking. The iron contents necessary to cause deposits of copper solutions have proven barren places and sections in the vein. I was speaking of the barren spots in the east and west veins, where they had cut the various porphyries and dyke [889] materials, and I will answer you regarding that by saying that I do know of these veins having very lean horizons at certain depths, and subsequent development has shown mineral recurring; I do not think that would be true in reference to the barrenness encountered in those mines adjacent to those faults on the east side, because of the distinction of the probable occurrence of the ores in the veins of recognized value that are operated in this side of the continental fault, and what is supposed and believed to be the origin of the ores found in the platings of the continental fault, which are from deposition from above, as shown by that fading out comparatively at shallow depths in all of the developments. These fault fissures in some of these cases probably are as deep as the vein fissures; I have no knowledge of whether they have been filled up or not at greater depth; solutions have ascended by a subsequent volcanic activity in the case of the Blue vein, which is a fault vein; it is not probable that you would have ascending solutions in other fault fissures than the Blue vein, but it is possible;

(Testimony of Elliott H. Wilson.)

we can trace the subsequent filling of the Blue vein,—blue fault vein as it has been called, to activity that was later than the deposition of ore in the original fissures. There have been at least four, it is thought, periods of ore deposition in this most remarkable district, in this exceeding activity that has not been paralleled in my observations of country elsewhere,—has not extended to the east side of the district, apparently. In the case of the fissure on the east side with the strike north and south, there is the crushed matter occasioned by mechanical force along the planes of the fault, and there is the chemical change in the granite, which has kaolinized the filling of the fault wherever observed, to indicate that it is a fault [890] fissure, and we found crushed matter in veins,—kaolin and clay; if you have commercial mineralization you have a vein fissure. The question as to whether it is a vein or a fault fissure depends to a large extent upon the mineralization of the stuff within the walls; I have explained before that a fault fissure may become subsequently mineralized, and has been mineralized subsequently by later volcanic action, which has permitted new ascensions of solutions. As a point in question, the blue vein off here a few hundred feet to the east, has been a fault vein originally and as such cut off the Parrot vein and threw its easterly extension north and constituted the Anaconda vein. Now, that probably originated as a fault vein for many ages; subsequent volcanic activity induced new solutions to arise, and that became mineralized to a very large extent with sulphide

(Testimony of Elliott H. Wilson.)

minerals and that fault vein, in that instance, is a mineral vein. In the case of a vein fissure, where you have not this quartz exclusively crystallized, but have granite crushed, coming from the contiguous territory, that filled the crevice, and then you have this ascending water to mineralize it; the water came up when the broken granite was attacked and the iron constituents were replaced with the sulphide minerals; there is no way I can tell how long this broken granite was in that fissure before this mineralizing water came up and seized it; they have got to a depth out there where the chrysocolla disappears and to where the cuprite disappears; I have no means of ascertaining how deep that fault fissure is; it was not in existence at the time of this volcanic action of which I spoke because that fault has actually cut and broken the veins in the east and west system of veins which I have observed, notably in the Amazon-Butte, and where, between the [891] platings of that fault, we have exposures of four to six feet of sulphide minerals; the Blue vein fault was mineralized at a date subsequent to the mineralization of the vein system; we know that must be the case because it has faulted the original vein system; there were ascending waters that came as the result of volcanic action; there is no theoretical reason why they may not likewise come across the valley in those fault fissures known as the continental fault fissures, but they have not done so; the reason they have not done so is because as you go down you get to a point where mineralization ceases; that is not the only reason; that

(Testimony of Elliott H. Wilson.)

shows the different origin of these ores. The ores on this side have probably come from ascending solutions from deep seated magma, and the ores from on the other side, which have disappeared slightly in depth,—slight diminishing as you go down,—are clearly of an origin that shows their superficial character. I do not know of ever having determined that there was any chrysocolla on the west side on the hill, when I have found oxidized material around masses of sulphides near the surface. I had always supposed it was one of the carbonates. It may have been chrysocolla,—they are very difficult to detect. The difference can only be detected usually and finally by nitric acid solution; chrysocolla is on the west side of the hill very sparingly, if at all; as I remarked, that material which is undoubtedly chrysocolla on the east side may have malachite or azurite on this side; I have seen it in the surrounding particles of sulphide, the ribs of sulphide in the Minnie Healy, where the green texture was apparent by the oxidation of that sulphide. I would call Defendants' Exhibit 75 a beautiful quality of granite, altogether unaltered; that green stuff has gotten into the pores of [892] the rock by a solution of sulphate of copper, which probably is chrysocolla. If that is the case, that is chrysocolla, that makes a very fine paint. The same factors that would contribute to the coloring of this material on the west side would undoubtedly contribute to the coloring of the material on the east side; I would make this explanation regarding that; there has been, no doubt, a leaching of great areas of

(Testimony of Elliott H. Wilson.)

the upper veins, and there has been sulphate of copper gone from the surface on the west side as well as on the east side, and this standing material is generally in that shape, sulphate of copper. The staining of the material on the east side, it is my belief that it came from the wearing down of great masses of rock which contained minute quantities of copper, and which have been carried down by vapor and rainfall, dilute solutions, and deposited in crevices and cracks. I have not happened to detect cuprite on the west side; as far as my observation has gone it is a product of the east side. I think Sam Newhouse sunk the Six O'Clock shaft six hundred feet deep, starting from bedrock, on this continental fault system. The next shaft I have personal knowledge of, was right on the Sinbad, which is situated out in the valley, I think sank several hundred feet through wash before they got into bedrock. They found some very flattering indications; I have seen, as I remember, some very beautiful specimens from there of cuprite. The Bullwhacker is the next one I have some knowledge of; it has been sunk to some considerable depth,—that lies immediately south of this ground in question and intervening were the Sarsfield and the Pacific. The depths and the nature of their deep development I am not informed of. The one next further south, travelling that way, is the Amazon-Butte, and there the values had pretty well [893] disappeared at a depth of fifty feet in this point, and down two hundred there was no evidence of it left at all. And the next one south, was the shaft

(Testimony of Elliott H. Wilson.)

sunk four hundred feet deep by certain eastern parties in the hope that at the intersection of these faults and veins, they might find certain large bodies of ore as found on the west side. I believe that claim was called the Little Boy, that that was sunk on. That was on this fault fissure, and that was very clearly marked at the surface with stained material in places and a good strong east and west vein that was relied upon to develop into something, but they got down four hundred feet and found that there was nothing at all *eight* in the fault fissure or in the vein. In one instance the mineralization markedly decreased at a depth of fifty feet, so it was of no consequence at a depth of two hundred feet, in the immediate neighborhood of that showing. I believe that the thing disappeared entirely,—that is in the Amazon-Butte. And I saw no evidence of that discoloration at a depth of two hundred feet, and much farther up the deposit might have been encountered I do not know; the fissure used to make an excellent quality of mud wherever it was encountered. This barren plane was encountered on the west side, I think, along about the twelve hundred on the Anaconda, if I remember rightly; I know there was some considerable speculation about it at the time,—what numerous people thought at that time,—I discussed the matter, the lessening of values, I believe, induced Mr. Daly to sell a portion of his interests to the Rothschilds on that account. There is another occurrence that has been reported and believed generally, the disappearance of values in an easterly vein in the Silver Bow

(Testimony of Elliott H. Wilson.)

lode; there the disappearance of copper values, or lessening of copper values, [894] was accompanied by an increase of iron in the vein; they got down four hundred feet below that worthless stuff and, I believe, they found values afterwards that came in below it; the mineralization sometimes extends into the walls; I have recited the instance of the Minnie Healy, where the succession of fissures, rather small, which had direction that leads to the suspicion that they might have occurred at very different times, had permitted emanation from the walls and the solutions which came up from below these fissures and made a mass of ore in the Minnie Healy mine, sometimes a couple of hundred feet wide, with interlacing veins of different strikes and dips, which had shattered the rock and permitted the access of the solutions. This mineralizing agency not only takes up the stuff that is between the walls of the fissure, but it gets into the adjacent rock and mineralizes that, making a replacement, and that is a replacement of the micaceous constituent of the granite, probably a modification of the tin can industry by nature. The boundary of the vein is where commercial value ceases. The walls of a vein would maintain its identity in case of replacement; this infiltration process is incidentally and generally irregular and, excepting in special instances such as I have recited in the Minnie, and it is generally a little beyond the true walls of the fissure. The mineralized material that we shipped as ore had assay boundaries, and mining boundaries would be determined by that. Vein has

(Testimony of Elliott H. Wilson.)

got to have definite, physical boundaries, not assay boundaries. One of the conditions of the location of veins when I was first operating here, was that before the locator of a vein had the privilege of recording a claim he must have one well marked boundary and that boundary was always one of the boundaries, [895] and that was not an assay boundary but a physical boundary, which was usually marked with clay selvage. My opinion is that you could not make a location upon that material outside, because it was outside of the walls of the fissure, and it is based upon observation in other camps; that is the case under the statutes regulating the location of veins. It is very deplorable that such deposits cannot be located legally. There has been no change in the statute which is based upon the original California perfect vein system, and which should be changed, and which we hope will be changed shortly, and I have in mind certain very valuable deposits that have been patented and worked on extensively in Bingham, Utah; it is monzonite, crushed granite, various amounts of granite ground up into small particles, and has made really valuable deposits, and the miners did not know how to acquire it except to locate the veins along the surface, which complied with the physical requirements of location, and so acquired ground on each side of the vein proper. In the Mullins shaft, I regard that as the vein within the walls of the fissure, and the material outside of that probably belongs to the vein if it is worth taking out; if it is outside of the walls it still might be shipped, but to locate it you

(Testimony of Elliott H. Wilson.)

would have to get some physical wall. I made a survey of this ground for placer purposes, and I was on the ground for the purpose of advising Mr. Kemper to acquire it either by making further effort to locate it as quartz or to locate it as placer; I do not know of him making any effort at that time to locate it as quartz; I know others had and unsuccessfully; they had made no discoveries; I don't know who they were; the Point Pleasant or Pleasant View,—one of those things down there,—had nothing in it. They had a [896] lump of quartz in the shaft that might have been hundreds of feet above bedrock. My information was in December, 1890, to the effect that this ground was located but no discoveries had been made; I was so informed by Mr. Kemper, I think. Mr. Kemper undoubtedly knew at the time I was out there that the ground was covered by quartz locations; a few days afterwards I made my official survey of this ground in question, and to be sure that there could be no injustice done by going to placer too rapidly; I showed the openings, the alleged discovery on this ground on the Pleasant View claim; I showed those openings to the Government,—called the attention of the Government to them in my report upon the condition of the ground as work not claimed by the appellant. I don't know whether I was required to do that under the regulations of the Department; I always made it a practice; I don't know whether it was from the regulations as I remember them or not; when I went there in December with Mr. Kemper I presume he knew that the ground was

(Testimony of Elliott H. Wilson.)

located then; the ground was covered with stakes; I did not go down at that time; I went down some time subsequent. At the time I was out there I went to the Pleasant View discovery hole or within a very few feet of it, and Mr. Kemper was along, but I don't remember whether I saw quartz on the dump; of course, it was all wash material as far as that was concerned; there may have been quartz contained in the gravel. I could not tell whether the hole was to bedrock, but I could suspect very shrewdly because there were worn particles of rock that showed no angular fractures.

Q. And if there was some quartz on the dump there and you did not know whether the hole went to the bedrock or not, how could you tell whether the quartz came out of the wash?

[897] By Judge BOURQUIN.—Objected to as immaterial, and further objection that whether he knew or not what was in the bottom of the shaft is immaterial; the only material fact, if there is any materiality in it, being whether or not there was an actual vein exposed there.

A. Because it showed no broken, angular,—broken edges, such as rock in place, if mined, would show.

The WITNESS.—I did not have very much concern regarding the condition of that dump at the time; I don't know whether there was any quartz on the dump at that time; I passed upon it not as an engineer but simply as a surveyor pointing out boundaries of contiguous locations. I think the depth

(Testimony of Elliott H. Wilson.)

of that shaft was measured a few days afterward, when I made my official survey. (Witness refers to note-book.) I noted it as being four and a half by six by twenty feet and that, as I understand the discovery—alleged discovery of the Pleasant View. There was another shaft twenty-three feet deep, which was measured off to the east of that. That was shown on the plat and in the notes of the official survey at that time. I did not know whether there was any quartz or not in the dump, but subsequently to the date,—I do not recollect,—I went into this shaft and determined the fact that the bottom was still in wash; I think this was in 1895,—at the time of the proceeding and compromise that I now learn for the first time was made regarding it; I discovered that this boulder was simply in the wash and not in place; I advised Mr. Kemper at that time that it would be unwise to locate the BIRTHA because of the fact that it being up in the mountain slope probably had rock in place, which would permit the easy location of an adverse claim upon his placer; there might be veins up there; I did not look at the [898] ground at all; I passed along its borders; if there were veins up there I would have thought they were running east and west, and they would get into this ground. I advised him not to include the BIRTHA ground because I wanted to assist a client in getting possession of ground without controversy; the BIRTHA was up a steep slope. I ran this line (referring to map); I do not recall whether I run this line (referring to map). I placed the corner of the

(Testimony of Elliott H. Wilson.)

Bullwhacker,—that was up the slope which showed bedrock, or probably was very close to bedrock,—so the supposition was that this steep slope would have shown bedrock at a comparatively shallow depth, at least, if not actually exposed. I do not recollect whether there was any notice at this discovery shaft of the Pleasant View at the time I was on the ground. I first learned of the existence of the Pleasant View and Point Pleasant locations in 1895, when I visited that shaft on the alleged discovery of the Pleasant View, but at that time I did not go to the discovery of the Point Pleasant; I did not know of the existence of that claim at any time. I went over that ground with Mr. Kemper to find out how much of the ground was unoccupied by patents in that neighborhood. I ascertained the information in my office regarding most of the claims so that I could furnish it as to the contiguous ground; I surveyed myself previously and surrounding this ground. I could have given him that information in the office, but he could not find these corners. I knew the location of the corners, and it was a question of an hour for me instead of a day for him to find the points. The Bullwhacker was patented in 1890. All this ground adjacent had been patented before I showed him those corners, excepting the Birtha, which was either a subsequent location or an unknown location at the time. [899] When I was upon this ground in connection with the preliminary observations, in connection with the survey I made there, there were simply those two shafts that I spoke

(Testimony of Elliott H. Wilson.)

of and two insignificant openings or cuts besides the two shafts, and these were shown upon the survey map I prepared; there were two veins on the ground whose course is east and west, known to me, and one of those veins is only a short distance from the Hornet discovery shaft north, in the Mullins tunnel. Outside of tunnel 31 I did not find evidence of the existence of any vein in any of the openings I examined. There is nothing on the surface of the ground to indicate there is a fault fissure running north and south in the neighborhood of shaft 21 and in the neighborhood of shaft 19; nobody going upon the surface there could tell that down at bedrock there was a fault fissure there running north and south, and is the same general fault fissure that you encounter in shaft 21 that you encounter in shaft 19; I cannot identify them as being the exact ones; it belongs to the system; it would hardly be probable that it was the same fissure projected southerly; the shafts are situated north and south from each other, the strikes in the bottom about what you would expect them to be if they were in the same fissure, but the dips are different and the material and the appearances considerably different *of* the material in the bottom of the two shafts. The fault fissure in shaft 21 dipped seventy-five to eighty degrees to the east; there is no uncertainty about its individual plane of movement within the fault. There are different dips in different planes within the area of the bottom of that shaft; the walls were not disclosed satisfactorily and clearly. The dip of the internal fractures of that fissure are

(Testimony of Elliott H. Wilson.)

there; I may have found the walls, but it is not [900] likely they were distinct and clear. They may have been a succession of lines of movement which constituted the fault and the vein may have varied slightly in its dip and strike, as was certainly the case in the shaft 19. In this material in shaft 21 there were lines clearly marked by reason of striations, northerly and southerly, and none that I detected east and west; I only observed and took the dip of one which was near the east end of the shaft. There were evidences of mineralization, it was stained with iron, and that fact would not constitute a vein; we had kaolin there; there was unaltered granite fragments there,—not fragments, but there was some of this kaolinized condition of the granite, shaded, on the east end of the bottom of that shaft, shaded it from a texture that was discernible as granite about the middle, to a decided, comparatively unaltered granite in the east side of the shaft, where the construction was clearly to be seen; that kaolin was derived from the decomposition of the feldspars and the silica within that ground,—could not be detected as such,—it was probably in combination with the aluminum; I saw no quartz; that is, this quartz with this crystalline texture that we have already referred to as being peculiar to fissure veins, and no other quartz excepting particles, presumably of aplite, and the unaltered, constituent mineral of the granite. I saw material like Defendants' Exhibit 96 down in both shafts 19 and 21, particularly 19; I think it is altered granite with all the micaceous matters dis-

(Testimony of Elliott H. Wilson.)

solved. I have seen material like that in veins near the surface, and in some instances that would suggest the fact that a vein was likely to exist in that neighborhood; in this instance it was running north and south and I know that fault has that north and south course, and saw this [901] material fading gradually into unaltered granite, as I say, on the northeast edge of the shaft, so I would expect that that was granitic material, out of which the irons have dissolved. I find a very conclusive evidence of the origin of this in a fragment which I took from this piece (indicating piece of sample). Here is a worn, broken fragment within the fault, which characterizes faults wherever you find them. I could not find anything of that character myself, and I looked right closely for it; I did not find material like that in the talc in the large veins running east and west; that represents broken material that has been ground by the movement of the walls into a pebbly shaped mass. I find quartz material in this piece. This material that is the subject of investigation now, is material that has been subjected to some change; it has suffered almost complete transformation; the decomposition of the feldspars, which are alkaline, and are the constituents of granite, has made a general alteration of the appearance of the granite, inasmuch as it has largely extracted the quartz and redeposited it as silicate of aluminum in place, which is simply clay, that is why the clay constituents are so prominent in faults in the granite. I do not recall that I ever observed any silicate of aluminum in veins

(Testimony of Elliott H. Wilson.)

so contradistinguished from vein fissures, excepting as the constituent of the movement planes marked by the walls of a vein, not as the vein filling of the vein itself. The northeast portion of shaft 21 is altered granite. The filling there is largely silicate of aluminum; it is very much more pronouncedly so in shaft 19. The silicate of aluminum is obtained from the granite through the action of some alkaline; that alkali is one of the constituents of feldspar; the alkali comes from the granite,—decomposition [902] of the granite. You do not see this quantity of silicate of aluminum in a vein, as contradistinguished from a fault fissure. This little piece of rock I called your attention to as suggesting to me a fault fissure is what they call drag rock, and occurs generally wherever there is a crushing of the material and a movement of it, which has been of considerable extent; the movement has not been so extensive generally in veins as it has been in faults; my observation is that there has not been such an extended movement in the case of vein fissures as to bring about that. I refreshed my memory a few days ago from my old notes and I find I completed the survey for the placer patent on February 10, 1891, and the openings I spoke of as being upon the ground were openings that have been in existence there since that time; I must have been upon the ground subsequently, because on the date of this survey, they had done insufficient or trifling work of what was necessary to obtain a patent. I must have gone on there and I have a distinct recollection

(Testimony of Elliott H. Wilson.)

of having located numerous cuts and shafts that were supposed to represent the five hundred dollars expenditure in the development of the placer, which was necessary for the obtaining of a patent. I could not find the date of that visit. It was some time after the application for patent, probably, because it was necessary to make affidavit as to the execution of that five hundred dollars' worth of work before the period had elapsed and present it to the applicant, for the Receiver's Receipt. I do not know those dates, but it must have been, probably, after the approval of the survey, after May 11th, after the application and before the sixty days had expired. There were probably some cuts or shafts sunk upon the ground different from the shafts I speak of, before May 11, 1891, because the applicant for patent was prosecuting [903] his work necessary for obtaining his receiver's receipt, in the interval between the date and the expiration of the advertisement. There may have been some work done there by Mr. Mason on the northerly lead and this Hornet discovery shaft sunk. That geological atlas is considered something of an authority to an extent, and the following: "As will be shown later, there is evidence that both these systems of fissures have been channels for the entrance of solutions, probably descending from the surface, which have produced a certain amount of secondary ore deposition and transposition of vein material," is in accord with my views of what has been called the secondary enrichment from the leaching of the up-

(Testimony of Elliott H. Wilson.)

per portions of the original filled veins, but it is not in accord with generally sustained views of people who have studied the matter very carefully, regarding the genesis of the great mass of copper ores that has made this camp almost unique in the history of the world; it is true to a large extent that the descending solutions have borne a considerable part; in the oxidized and upper portions of almost all the Butte veins, which we have observed to be barren of copper contents, for from a hundred to four hundred feet, the original filling of that portion of the vein,—that upper portion of the vein,—has undoubtedly, clearly been leached, and that is what he refers to,—the solutions descending and making the so-called secondary enrichment of the vein, which started the bonanza period of the mining development of the Butte camp. That is a publication issued at the instance and under the auspices of the government, by reason of reports made by geologists. In regard to the following: “The original mineral-bearing solutions evidently ascended along the fissure veins, and were probably at high [904] temperature, though not necessarily under great pressure. On the other hand, secondary deposition or transposition of the copper minerals may have been produced by waters descending from the surface,” the author very properly used the word “may,” because this matter of ore deposition is something that has been worked out. I think probably that he is right, especially with the introduction of the question mark “may.” The

(Testimony of Elliott H. Wilson.)

reason for my opinion in that matter is that the deposition of ore is a very much vexed matter. As some author has said, the geologist's work is practically complete and the balance of it is up to the chemist,—how that ore was deposited and the chemical reactions,—they are not at all clear,—and the laboratory experiment is not conclusive because it has not had what nature has had,—great heat and great time and great pressure. The Government probably will issue something else in the near future where this matter or ore deposition will be worked out under conditions which will afford a great heat and very great pressure and intense electrical activity, which the ordinary individual and experimenter has not means to use. I have no theoretical views concerning the matter, because I am not a chemist. In regard to the following: "Where the fissures presented continuous open faces the materials brought in by the original mineral-bearing solutions filled these faces, thus producing the ordinary type of fissure vein deposits; but a large proportion of the fissures were mere cracks in the rock, only large enough to admit the passage of the solutions, and from these the solutions penetrated and attacked the adjoining wall rock, removing part or all of their original constituents, and replacing them by vein material, thus constituting the type of replacement veins," he says a large proportion,—I don't know what proportion. Such methods of origin have been proven [905] in the camp, but I know that is the case. I have explained it very

(Testimony of Elliott H. Wilson.)

clearly in my case in the operation of the Minnie Healy. I assent to the following: "In a general way it may be said that in the granite the copper veins are more commonly replacement deposits, while the fissure vein deposit is more common among the silver veins. The economically valuable ores of the Butte district are bound exclusively in the old rocks,—granite, aplite or quartz porphyry." That is all there is,—sparingly of the aplite and quartz porphyry, and very much in excess proportion in the granite. In regard to the following: "In secondary veins, instances are observed of breccias of vein materials cemented by quartz (Lexington Mine) or by manganese minerals (Magna Charta Mine), and again of breccias of quartz and country rock cemented by quartz. The typical replacement vein is, as a rule, the result of the action of ore-bearing solutions along a series of closely faced parallel fissures. Under existing conditions the original fissures are often not distinguishable, especially when the mineralizing action has been very effective and the ore body is a very wide mass mostly or entirely made up of metallic minerals. The prominent characteristics of this type of deposition are: (1) absence of symmetrical banding or comb structure in the vein material and of breccias of country rock cemented by vein material (both included under Posepny's general term 'crustification'); (2) great irregularity in the width of the ore body, which sometimes reaches enormous dimensions in the copper lodes; the range is from one to one hundred feet; an average in the prominent

(Testimony of Elliott H. Wilson.)

veins may be taken at eight to forty feet; (3) general lack of definition between ore body and wall rock; this is observed not only in the ore body as a whole but in individual bands of [906] country rock and vein material." I subscribed to that in this portion of the district, but I have explained, probably, the reason for its existence,—various and succeeding volcanic action in this most remarkable region; I subscribe to this doctrine so far as it is applicable to the Butte Hill, but none that I have ever seen anywhere else. I have seen ground outside of the Butte Hill where the mineralization extends into the country rock; this doctrine would not be applicable in that case because there is no evidences of the dynamic, volcanic action that originated these remarkable conditions on the west side; it did not extend that far, or that action faded in strength so that depositions were not originated that way generally; I account for the existence of those fault fissures by just a general subsidence of the mass of the country, hanging-wall dropping and the footwall coming up. The existence of those dykes in the granite seems quite plain to me; referring to the aplite dykes,—granulite,—they evidently have been forced up from probably the same magma or mass of molten material from great depth, and the granite was probably yet uncooled and that mass, probably, for the fact that it was uncooled,—with the rock masses and stringers of aplite lying in all directions, everywhere. The existence of vein structures would tell you to a certain extent whether the fissure was

(Testimony of Elliott H. Wilson.)

the result of volcanic action; a resultant subsidence would not have any such result at all in the filling of the consequent fissure; the fissure comes into existence in utter disregard of the filling; it is characteristic of the vein, of vein bearing metalliferous bearing material filling on this side,—the west side of the district, there has been at least three or four successive periods of vein filling, and even the fault, [907] such as the blue fault, has subsequently become filled with metalliferous bearing mineral, robbed either from the original veins or brought up independently and filled from below. Those succeeding actions are entirely wanting on the east side, so far as I have observed. In case of vein fissures their existence is due to subsidence in a general way; I should regard those occurrences,—the fault fissure may subsequently be filled, as it is filled in the blue vein,—that is, possibly from below and possibly from the robbing of adjoining fissures or values. The following is a speculation: “Secondary deposition, or transposition of already deposited minerals, has played an unusually important role. In the case of the copper veins it has not been confined to the oxidizing action of surface water, which has resulted in impoverishment of the ore body, but below the zone of oxidation, it has resulted in the formation of the richer copper minerals, bornite, chalcocite, and covellite, in part at least by the breaking up of the original chalcopyrite. Unusual enrichment of the middle depth of the lode has thus been caused. Whether the two processes of

(Testimony of Elliott H. Wilson.)

impoverishment and enrichment have been differing phases of the action of descending waters, or whether the latter may have been a later result of the rhyolite intrusion, has not yet been definitely decided. It is, however, fairly well determined that the enrichment of a copper deposit is so closely associated with the secondary faulting, that it may be considered to be a genetic result of it." I don't know but what it is a very good one. It does not conform with my views in reference to that altogether. That matter has been modified and changed from the result of development. For example, you will find, probably, the same author will class copper glance, or [908] chalcocite, as the result of secondary enrichment, whereas it has been practically proven to the minds of most people who have observed it, that the occurrence of great bodies of copper glance below the depth of three thousand feet shows that secondary enrichment must not have been the original origin, although it was undoubtedly in part, but it may have occurred,—that sulphide chalcocite may have occupied as an original mineral and been deposited in the veins as such from below. So this speculation of this gentleman is interesting and might appear almost conclusive, if other facts established since had not proven that it was a speculation only,—modified to the extent that this principal mineral of the copper lodes in Butte must necessarily have been a secondary deposit,—disproved to that extent,—that the great depth at which it occurs, and the form in which it occurs, renders it

(Testimony of Elliott H. Wilson.)

entirely probable, though that is not certain, that it is one of the original sulphide minerals deposited in veins from solutions from below. I have not seen the publication you have been reading from for years; I have read it, I believe, a long time ago. It is a very interesting speculation. It is a geological atlas of the United States, very ably prepared and the result of a great deal of study, but where facts are stated that are almost conclusive and substantiated by my own observations as truth,—but where speculations are injected, they are of questionable value and questionable truth.

I went into shaft No. 19, and saw a lead in the Mullins tunnel,—a true fissure lead running east and west, having a regular strike and having mineral; I did not see either a final termination of it; I would say almost certainly that it continued on this strike further and on this dip; there is no [909] reason for my supposing that it ended before it got as far westerly as that. I should say that that fissure must have continued westerly; it was not a very important fissure; it was rather a trifling affair in itself compared with other great mineral producing fissures; I think that fissure probably so persistent and would have some considerable farther length; it is not very strong, don't show very much gouge upon its walls, indicating movement, but it has some considerably greater length, no doubt. There is mineral south of the fissure in these cracks and broken granite near the surface; I don't know to what extent this mineralization goes south of the fissure; as far as I have

(Testimony of Elliott H. Wilson.)

observed it it runs about to this Hornet Discovery shaft; I did not see it further in the cross-cut south. Calling attention to Defendants' Exhibit 1, if this vein extended westerly, having the same strike that it has in the tunnel, it would not go very far north or south of the shaft; it would be in this quarter section; it would be in that same region. It would go somewhere in that direction. If that lead thus exposed in that tunnel pursued its westerly course and maintaining its same strike, it would go within a few hundred feet of shaft 19, one way or the other, and I will tell you why. This elevation of the shaft 19 is a hundred and fifty feet below the tunnel; this strike or dip of that vein a hundred and fifty feet below that would carry it, say, a hundred and fifty feet south; so you take a right line and projected into that region—you have forgotten the fact that that is modified by the dip of the vein, which is a hundred and fifty feet below, which would be a hundred and fifty feet further south. If I was going to dig that shaft and fix the thing up, I would probably put the continuation of that vein on its dip down in that region somewhere (indicating on map), [910] which I mark A-1, on Defendants' Exhibit 1. That is about it. I have not studied it out, but it certainly would not be in the right line.

Q. Now, so that we can inquire particularly into that, removing the matter of elevation entirely, and simply considering the strike of the vein, will you project it and see where you will put it?

A. Can't remove that.

(Testimony of Elliott H. Wilson.)

Q. But I want you to do it—simply to project the lead upon its strike as is manifested in the tunnel.

By Mr. SHELTON.—We shall object to counsel insisting upon the witness doing something that he said was an impossibility.

By General NOLAN.—There is not anything impossible about it. He has a rod, a pencil and he has the strike, and I want him to project it.

The WITNESS.—If the elevation was the same it would be about where it has been marked in this black pencil on Defendants' Exhibit 1—if the elevation is not the same that has nothing to do with it. The dip of the lead as I observed it in the tunnel was about sixty degrees or such a matter, at various points I saw something of that sort. I did not even take an observation. I estimated the rather varying dip exposed as sixty degrees. I figured the difference in elevation at probably two hundred feet, and the distance with that difference in elevation would be about a hundred and twenty feet; it will be about six feet in ten—a dip due to a sixty degree curve would depart from the vertical, I think, sixty feet in a hundred, and for an estimated distance of difference of elevation of say two hundred feet, there would be a hundred and twenty feet. I would put this on at random—did not figure [911] it exactly—because I did not have any of the conditions that were prerequisite to accurate ascertainment. Now, this thing might be modified further. I think I have made an error in the matter here. The surface, presuming there is a difference in elevation of two hundred feet be-

(Testimony of Elliott H. Wilson.)

tween the collar of that shaft and the elevation of the floor of that tunnel where the vein is disclosed, is in the neighborhood of eighty feet to bedrock, that would carry the vein point which I have placed upon this map and marked A-1—it would carry it fifty feet further south, or fifty—that fifty feet being due to, or multiplied by sixty—forty-eight feet, exactly. So I will just correct the line here by that assumption and carry this—sixty and sixty is a hundred and twenty, and forty-eight is a hundred and sixty-eight, so my A-2 (marking A-2 on map) would be the accurate position of the vein on these assumptions, if it existed. I will mark A-2 on Defendants' Exhibit 1. The difference in the elevation, I guess, two hundred feet in the collar of the shaft and the bottom of the tunnel, and the difference in the elevation of the bedrock and the bottom of the tunnel is, with that assumed as correct, is an additional eighty feet. That would be two hundred and twenty feet. It is an approximation; it would be very easily ascertained. And if I was trying to fix a location of a shaft to strike that lead, I should certainly acquire the definite knowledge by a few minutes instrumental observation, which would be a necessary factor in the case. I would find out the difference in elevation by ascertaining the difference by leveling, or by calculating the distance—calculating the difference of elevation which would be obtained by calculating the difference at the horizon and the difference in the points. Shaft 19 had some [912] of the elements that you would find in a vein outside of the mineralization;

(Testimony of Elliott H. Wilson.)

we have massive kaolinized matter which has—a lack of quartz structure, a lack of minerals, excepting the incidental stain, which would be of iron in this case—which would be, of course, expected of such places and near bedrock. The element that you have in common is the clay, but clay occurring in an entirely different manner from what it has occurred in veins, as I have observed—a very much greater amount—in fact, it is all clay; the clay is an altered country rock. I found nothing but clay in that shaft, generally quite soft; I did not detect any altered granite in my hasty examination of that. I did not notice any gangue material there, excepting as to clay would be called gangue material; slickensides means the smooth, bright surface made by clay rocks rubbing over each other—the polishing of the clay substances by movement on the dip, due to the faulting. I have never seen any striations which would mark the movement northerly or southerly of the materials, excepting the Amazon where I found such striations. This condition manifested itself by the polished surfaces that we dug into and exposed which evidenced the roughing action of one mass of clay upon the other; I saw this polished surface on the face of the material, of this clay, and that surface was a polishing of an east dipping, northerly and southerly striking plane, which was a plane of the continental fault; that was a good sized fault in that shaft; that fault has quite a large movement; it is larger than any we have been discussing heretofore, as evidenced by this great movement and evidencing entirely a disappear-

(Testimony of Elliott H. Wilson.)

ance of the kaolinized material that the fault cuts; that is as wide as the shaft—I could not see the walls. The fact could be [913] developed that walls exist there by the prosecution of work—walls or a fault or walls of fault, if it exists in the neighborhood, but there is no vein there, no lode there, I should say. There was nothing there to indicate to me that there is any copper in that material.

Tunnel No. 35 is in aplite and granite mixed, where you strike bedrock; there is only five or six feet of it; it was all in wash; the granite and aplite interlock; it is a mixed up mass there, without very regular lines. We know that the aplite was a subsequent intrusion and interjected into the regular mass at that point, and there is no evidence of any mineralization that I observed. I think possibly there was a little iron coating in spots on the aplite surface; I do not know of any further change. There was only five or six feet of the bedrock, exposed there.

I went into Tunnel No. 36, and the material in there was aplite and granite mixed, and a slight fault vein in the face of the main tunnel, and the only noticeable thing—curious thing—was a bunch of silicified granite, as big as your fist or bigger—some sort of a hydrous, silicious deposit, that miners call water quartz; that is on the south, near the face of the south prong of that tunnel 36—of no consequence or significance. It is of no consequence as bearing upon this mineral character. It is just little isolated bunches of highly silicious, glassy quartz, just in bunches. I don't know what its origin could have

(Testimony of Elliott H. Wilson.)

been. I have understood it is a hydrous silicate deposit, which my understanding of the word hydrous, means a water condition, containing water, in other words. I have seen it in numerous places all over the country; it occurs in bunches, not connected. Exhibit 108 is aplite; [914] I think I saw some aplite in the cross-cut from the tunnel, and I saw no quartz crystals characteristic of vein filling here at all; there is some glassy quartz through here, I observe not characteristic of vein filling. I did not observe any of this material here; I don't know where this came from; I did see some highly silicified granite at a point about halfway between the surface of the wash and the face. If I saw such material with such structure conditions as the material itself, it would look as though there might possibly be a vein; the material itself has suffered considerable alteration from some agency or other; it has been fissured in the first place, and it has been impregnated with iron to a limited extent. I would have to see its structure to determine whether it might possibly be a vein or a fissure; it might come from a vein. My recollection is that material of that kind was not encountered by me in the examination I made in tunnel 36, and the working appurtenant to it, excepting in one instance in which I saw a band, if you will, of silicified quartz in place at some point in that tunnel, and very similar in appearance, excepting it was more highly stained with oxide, and very similar in appearance to that testified to in shaft No. 1 as being silicified granite rib.

(Testimony of Elliott H. Wilson.)

I did not go into tunnel 37. In the case of the Hornet Discovery shaft, in the bottommost part I found a stringer of ore or cuprite, twelve or fifteen feet below the surface of the bedrock; that cut that lower cross-cut between the Mullins' tunnel and the bottom of the Hornet shaft, and it was visible in the west side and was not seen on the east side of the drift, referring to Complainant's Exhibit 15. This curious little occurrence was in probably a little more than half way [915] between the bottom of the Hornet shaft and the point where the Mullins vein was encountered by the cross-cut and had a dip to the north very decidedly, fifty-five degrees probably; that is a brilliant red cuprite streak there. I noticed mineralization in the Hornet Discovery shaft and on the upper cross-cut level; the country is quite broken, open—that is, the rock has been shattered by something and there has been the remains of the faulting or the cooling planes—the point planes, as they have been termed, in the granite, and they have afforded channels for this deposition of copper from above that I have been describing elsewhere; they were carried through by reason of percolating waters into the joint planes, and I further say to you that you can find yourself here only the presentation of the facts; in the cross-cut there are other very noticeable occurrences. There were channels afforded for the deposition of these solutions, independent of the joint cracks which might account for the deposition of the mineral in the shaft proper. There were in the cross-cut a plane of the continental fault which is

(Testimony of Elliott H. Wilson.)

highly mineralized up right to the Mullins vein; I did not use a pick to see if the mineralization extended further in, but aside from that, there were spots of it with oxide on the walls, occasionally, of the cross-cut; there were lines in the material up in the neighborhood of the Mullins vein, where a plane of this fault was observed, and it is marked dip north ten east, running north ten east and dipping seventy degrees to the east, on Complainant's Exhibit 15. That channel disappears in the wall of that working and it is only mineralized in the neighborhood of the vein. There is no mineral of any consequence at all until after you get past the Gulf Discovery. Between the Gulf Discovery and the Hornet Discovery there is no noticeable mineralization—at least none [916] that occurs in fracture planes. There was mineralization in the joint planes and there blotches of red oxide observed occasionally in the neighborhood of those. They were solid streaks of chrysocolla, principally, of half an inch and some one or two instances of an inch, I think, and there was a standing outside of that, presenting a mineralized appearance, of probably eight inches. I have seen chunks of this cuprite in the wall there bigger than my fist; they were in the granite—I don't know whether in any special planes; they extend beyond the lines of the planes and into the body of the granite; a plane is only a sheet you know, and these solutions have penetrated the east side of that, and the surface of that sheet; there was an element of continuity about it, of the joints, and the mineraliza-

(Testimony of Elliott H. Wilson.)

tion following the general direction of that joint; these joint planes had a dip slightly to the north, probably; they were very irregular, some of them, due to the shattered condition when the granite mass had waved around in this manner (illustrating with hand), but their general dip was to the north and west; some of them had a dip of as much as fifteen, twenty degrees to the north—nearly flat; there was nothing in the appearance of things there to suggest, assuming this fissure existed as is disclosed in the tunnel, that there was a replacement of mineralization, extending from that fissure south to the Hornet shaft. The material existing there in the cross-cut presented to my mind the fact of mineralization so that it would constitute ore commercially—there was some beautiful ore there, but it had no continuity; when I first became interested in mining, if I had seen that, I would have become quite excited. Cuprite is the highest form of mineral compound, going over eighty per cent, and those crystals of [917] cuprite are very interesting, but, as I happen to know now that those things are only superficial, I would not be interested. I would ship that material if it were commercial ore, and to the extent that the mineralization would go, and in that respect it would not differ materially from the ore within the walls of a fissure; I know that in the Amazon that mineralization does not go down two hundred feet; the mineralization terminated at the Hornet shaft in the wash. I see evidences of quartz and feldspar in Defendants' Exhibit 9; I do not find any mica in it; it

(Testimony of Elliott H. Wilson.)

seems to be granitic in texture—quartz and silica and feldspar; I do not know what it is; it might be in a vein—might be some altered granite—you would find that in a vein. It is not vein quartz because of the glassy texture of the crystals, excepting inasmuch as the quartz is probably a residue of the granite—of the constituent of the granite; it is not vein quartz, excepting in that sense. The feldspar and quartz have been left as constituents of the granite and as unaltered granite, which is often vein filling. It would be, no doubt, material that could be found within the walls of a vein. I don't know where it was taken from. I am not familiar with it. Judgment about those things is always dependent upon the actual occurrences of these minerals with the structure of the country in which they are found.

Exhibit 27 is a streak of cuprite and the enclosing granite walls—the granite material has been saturated with chrysocolla and silica of copper. That specimen is about the only thing I observe here as the altered granite out of which the iron has been extracted by the same solutions which deposited the chrysocolla, which is a mineral content of that piece; this is another mixed cuprite and chrysocolla occurrence and I am not [918] sure whether that is all chrysocolla or it may be carbonate. That is only determined by a chemical analysis; if it is granite, some considerable alteration has occurred,—displacement; that is very fine ore, and I found material of that kind in the cross-cut, noticeably along the planes of the fault that I have noticed between the Gulf Dis-

(Testimony of Elliott H. Wilson.)

covery and the Hornet vein,—that is, speaking of the upper cross-cut. This cuprite in the piece you hand me is in the planes of the granite, or the planes of the fissure. The mineralization of this territory outside of the fissure veins was not accomplished from the faulting; it was accomplished from erosion of the country and by the carrying down in solutions of a very little, slight saturated copper, or waters carrying copper, in connection with sulphuric acid, that was obtained, of course, from the deposition of the original chalcopyrite which is contained in minute quantities along the granite of this neighborhood; carrying it down into little fault fissures, as observed in this neighborhood, and into joint planes of the granite, and in channels,—and in channels for descending waters to enter. I have told you the fault fissure presents some very beautiful vein filling of this red oxide and chrysocolla; it is found, as I have told you, particularly between the Gulf Discovery and the Mullins vein as shown in Complainant's Exhibit 15, and also shown very nicely in the intersection of the same fault plane with the Mullins vein, down twelve feet below the previously mentioned occurrence, and in Complainant's Exhibit 16. It is beautifully shown there; that fault fissure is filled with chrysocolla; this mineralizing solution is carried down by the fault fissure, and is also carried down in this instance by the same fissure which we encounter in the Mullins tunnel,—undoubtedly that vein fissure has the same material,—that same [919] fissure as is probably the case as you have

(Testimony of Elliott H. Wilson.)

observed in many other portions of this district,—is one of the original veins that has been leached out and the leaching out of that material has started the original channel for these ore deposits, and as far as we have mined, and as far as we can see in there, that is filled with vein ores of exactly the same character as are found in the fault fissure and in the joint planes, and as this mineralizing fluid descending through this vein fissure that we encounter in the Mullins tunnel, the mineral might have come from there in part, but it probably just came from splashing of the rain that carries it down all over the country for miles north and south, but I think that that fissure that was presented by the Mullins vein on the Complainant's Exhibit 15, that that was entirely oxidized and the pyrite minerals with which it was originally filled have disappeared with depth, as they went over to this side, and this is filled with the same surface solution, but to what depth I do not know. In shaft No. 9 as I remember it, there would be two hanging-walls. Those streaks were separated,—they were not part of the same vein, and those streaks had an easterly and westerly course; the course was such that this first wall, going in, I measured four feet from the timber, inside of the timbered shaft, and it was such that its course continued easterly would not be,—would not intercept any part of this shaft; these streaks from the cross-cut ran eastward and the cross-cut runs north. You encountered the wall of the first streak on the east side of the cross-cut at a

(Testimony of Elliott H. Wilson.)

distance of four feet from the inside of the timbers of the shaft; the country rock in that cross-cut was granite; those two streaks running east and west were very slightly mineralized; there was vein material in the streaks, [920] altered granite, as I recollect it, principally; the streaks constituted separate veins probably, because of the unaltered condition of the granite that separated them, and both of them had practically the same strike, and both of them practically had the same dip, very slightly to the north, about vertical, as I remember them. I saw no material like Defendants' Exhibit 7 in the cross-cut or in the streaks you are referring to; I made no note of it if I did; there is some quartz in that little piece you show me,—it looks like aplite to me. I did not see any material like Defendants' Exhibit 24 in shaft No. 9; I would call that altered granite, such material as you would sometimes find in a vein. I did not see any material like Defendants' Exhibit 33 in any of the portions of that shaft or in the cross-cut. It may have been vein material and it may not; the granite is altered; you will observe that it is robbed of its iron metal,—altered in that respect. Defendants' Exhibit 85 is a piece of aplite, slightly stained with chrysocolla,—granite that has been altered; that might be vein material. Defendants' Exhibit 109 would appear to be vein matter. I see alpite and altered granite suspended in the specimens. The mineral matter is almost exclusively iron, the others were copper; that is different in its mineralization altogether from the preceding sam-

(Testimony of Elliott H. Wilson.)

ples; I noticed those two veins in the shaft; there absolutely was no selvage between that and the country rock, and the work done in the cross-cut did not show that they had their ending there. I saw two veins in the cross-cut in tunnel No. 31, the north cross-cut, eight or ten inches of highly stained aplite, crushed and colored with silicate of copper, and I would say it had the appearance of being sufficiently mineralized so as to make it commercial ore, but I did not make any tests to determine that. I might say here regarding that [921] what you would call commercial ore. The specific gravity of this compound of copper called chrysocolla is about that of granite, and the aplite, so that the ordinary method of water concentration on tables is impossible in saving it. The only way that these values could be saved would be in a furnace, and such, I believe, has been the practice in the shipments during the high price of copper, from the Bullwhacker and from the Amazon, and possibly,—I don't know concerning the others,—but the ore that would be commercial if it were in sulphide form,—two per cent ore,—would be of no value whatever, because two per cent ore yielding in the furnace, say forty pounds of copper on a fifteen cent market for copper, would have all its returns absorbed by the smelter charge, and leave nothing for mining,—so that would not be regarded as commercial ore by the miner. Now, I don't know what copper content of these little veins was; it may have been more than two per cent. I visited this place on two different occasions; at the time of making the first

(Testimony of Elliott H. Wilson.)

visit there was only one of those veins exposed and then, by reason of extending the cross-cut, upon a subsequent visit, there was another vein exposed; the first vein I saw there was eight or ten inches wide; the second vein is rather irregular and its width, as measured from different points, is eight or ten inches also; those were very well defined crevices,—I would call them true fissure veins; the vein filling was crushed aplite; the walls were of granite. That region has singularly concorded masses of aplite injected into the granite, and my recollection at that point, however, is that it was granite. I noticed slight mineralization of the country rock before I reached the first vein, to the south of the first vein, and I noticed a very remarkable occurrence in a few feet [922] from the drift, where I actually dug out a nice specimen of this chrysocolla from the wash above the bedrock, which shows probably the peculiar character of the deposition of this silicate of copper; I was not below bedrock at all times in this cross-cut; as you enter the bedrock, there is only three feet of the solid rock exposed. That upper portion of the cross-cut there is in the wash,—debris material from the slopes. The face of the cross-cut, as I last witnessed it, was all in solid bedrock; the material between the first and second vein is unaltered and I observed no cuprite, but I observed cuprite in what I call the country rock in the cross-cut; as I recollect there were one or two splotches of cuprite in the wall. I made no note of any such occurrence, however; I would not be sure one way or the other. Those two

(Testimony of Elliott H. Wilson.)

veins as they appeared in the cross-cut are twelve feet apart. I say I did not notice any quartz in that cross-cut,—of course, one of the minerals of aplite is silica, but there was no vein quartz in either the fissures or the country rock. I do not recollect seeing any such material as Defendants' Exhibit 82 in that cross-cut; that is stained aplite; there is no vein quartz whatever about that; that glistening stuff is a constituent of aplite, a very silicious constituent of aplite; some portions of it I see with iron, but most of the faces of it with chrysocolla; I do not find any quartz impregnated in there at all; crystallized in the condition I told you about the other day; there is silica in that but not the silica that is deposited from ascending solutions in the humid way; that silica was injected into the granite mass as an aplite. In this case, if you will rub your finger over this surface adjoining the very glassy portion that you have called my attention to, you will find the texture due to aplite, sort of a sandstony feeling. Now, by segregation [923] of the mass of feldspar and silica, which constitutes the principal ingredients in aplite, you will find, no doubt, such faces as that presented at this point where there is a glassy occurrence, where, undoubtedly, the silica is nearly pure, or more nearly pure than in the associated feldspathic compound called aplite; from that sample I would not call that vein quartz, and if I saw it in a fissure, I would not call it vein material without some further exploration than can be afforded by an inspection of a hand sample that I never saw, but going to the re-

(Testimony of Elliott H. Wilson.)

gion from which it came and knowing it,—I have seen no quartz vein,—no typical quartz as a quartz vein there, and I would not hesitate to pronounce it aplite. It is not necessary to have quartz in a vein in order to make it a mineral vein; other rock in place mineralized would be vein just the same as if there was quartz there; I would call that specimen mineral-bearing rock, aplite in this case. In the examination I made in tunnel 31 and the appurtenant openings I did not find any material like that in that cross-cut; forty feet beyond the cross-cut I saw something of that nature, where there was some exposure of such matter as was probably,—on Complainant's Exhibit 17, the continuation has passed this cross-cut,—this vein is presumably the same one as was encountered in the cross-cut where this occurrence has been testified to, and I saw material similar to that. There has been fissuring and there is vein structure exposed in that cross-cut and in that tunnel to the east of the cross-cut; they lack one element that we like to see, that is a selvage or a gouge on the walls, but with that absent I would not say positively that they were not fissure veins. The material between the two veins is not mineralized so as to constitute commercial ore; there is generally an absence of cuprite. Defendants' Exhibit 99 is [924] stained aplite stuff I saw in tunnel 31 forty feet on, and is very slightly mineralized with copper, probably a hundredth of one per cent of copper in that; the aplite is altered apparently by a segregation of more silicious bands; the elements of aplite are not re-

(Testimony of Elliott H. Wilson.)

moved by the mineral; there is so little of the iron mineral in the aplite, although it does exist slightly; in this granite here biotite has generally been removed; on the west side of the camp there has been quite an alteration of the feldspars of the granite; I presume there may be some slight alteration of the feldspars in this aplite. You have got the same elements in the aplite, but not so much of them as in the case of the granite. In the piece I am examining, if any of the feldspar existed in any of this,—several shapes,—it is not now visible. Apparently there has been no alteration of consequence beyond. There seems to have been a segregation in an aplite dyke of the silica in splotches and bands. It has the characteristic painting of silicate of copper on these surfaces (referring to sample); probably, judging from the appearance of the thing, it is so insignificant that the copper content is so insignificant that it would not yield assays. The material we encounter in the north cross-cut in tunnel 31, differs from the material visible in the tunnel to the east in appearance; at the cross-cut they have been more shattered; that shattering is not nearly so marked further in the main working, but there is evidence of that shearing movement along that aplite mass. The first vein encountered in the cross-cut shown on Complainant's Exhibit 17 has practically,—is practically the same as that encountered forty feet easterly, in the main working; it has approximately the same dip, about 75 to 80 degrees north; you can never prove the continuity of a vein [925] without actual exposures by

(Testimony of Elliott H. Wilson.)

work. There is an interval of thirty feet there that is not worked, but the character of material in one exposure is very similar to the other. The strike of the vein in the cross-cut is north 80 degrees to the east, I think, at the first vein encountered in the cross-cut; I took the direction as the exposures run, on both sides of the cross-cut, and the strike of the more northerly lead in the cross-cut was parallel with the first one encountered, north 80 degrees east; I did not use my compass there, excepting approximately; the workings showed it, which had been accurately surveyed by instrument, and I only made an approximation of the accuracy of that work. By reason of the faulting there, this vein I encountered in the tunnel east of the cross-cut was interrupted or stopped, as shown upon this map, Complainant's Exhibit 17; the width of the fault there is a couple or three inches, I think; there is no evidence of the vein at all east of there, in any of the workings in that tunnel to be identified with that vein; it is showing some mineralization beyond; there is a little fissure, slightly stained, in the cross-cut, running south from near the end of the working in question. The strike of that fissure I encountered in that cross-cut near the surface of the tunnel is easterly and westerly, and the dip as I remember it is nearly vertical; it was quite an insignificant little thing; I did not pay much attention to it; there is some mineral also shown in a little opening in the north side of the drift, near the face of the working we have been discussing. I am not able to establish any connection between that min-

(Testimony of Elliott H. Wilson.)

eralization or that stringer and the veins to the west,—I don't know whether there are any connections; they are so insignificant as compared with the stronger mineralization in the first [926] two discussed, but I expect possibly the fault is entirely,—may have thrown the continuation eastward of the first two showings discussed and made a determination of any possible identity of these two little trifling occurrences,—connecting them at all. That fault has interrupted them, and may have thrown that in,—if it has not thrown them, the rather nice matter in the cross-cut and main working is not very flattering to the eastward. There was a staining in this cross-cut; it is so insignificant that it has not the same bearing as it would if it had been mineral deposited in the joint plane. I would call Defendants' Exhibit 77 a pretty good piece of silicified granite, or very highly silicious aplite, I don't know which; there is a lot of quartz in it; it is nothing like the quartz I have been designating as vein quartz; this piece we are looking at is aplite; this piece is aplite. I think we might find material of that kind in some of the openings I examined on those two leads; it must be in some of the openings to the east of this Rabbit tunnel because there the mineralizing solution has been copper; here it seems to have been of iron, and that iron stain is characteristic,—something of shaft,—the material in shafts 1 and 2; you might find this material in a vein; I saw nothing like that in shaft No. 1; I said on account of the iron staining matter you might find in those shafts, west of the

(Testimony of Elliott H. Wilson.)

Rabbit tunnel, because these copper bearing solutions have been intercepted, and at that point the surface wash has found channels and cracks to deposit a sparing amount of copper, and beyond that these fissures have probably been stained with iron,—certainly have been stained with iron as far as my observation went. I think Defendants' Exhibit 30 is highly altered granite, apparently very silicious,—I mean that the quartz, or content [927] one of the three components of granite is very much in excess of the other. The feldspar is of a slight portion as to the amount in which nature has usually mixed them. In this case there is a sort of a structure suggestion that would lead me to call it granite, rather than aplite; it is granite that has been altered, though by probably this,—it don't seem to have been altered in the sense that we speak of the alteration of vein fillings, it seems more nearly approaching an aplite. I don't know but what it is,—I see that it is iron stained. Altered granite is vein filling, and in the case of the alteration of granite, so as to make it vein filling, you very often have mineral removing the biotite and the hornblende and the iron, and if you have that granite in vein filling subjected to that alteration it is vein matter if it was in a vein,—if it was in the walls of a vein; if you have aplite within the walls of a fissure, the feldspar removed, the biotite removed and the iron removed, and mineral substituted for these elements, you have a vein; you have a vein matter there, but what I have spoken of as a highly silicified granite,—I was referring more par-

(Testimony of Elliott H. Wilson.)

ticularly to another occurrence of granite in which a segregation of the most silicious parts of the elements right in the mass of the granite may often be observed, and there a silicified band of unaltered granite, with very much more quartz or silica in it than is usual,—the proportion in the ordinary granite of this district. LeConte is an authority that vein quartz came into that fissure after the formation of the fissure, in aqueous form from beneath; that is largely due, however, to the occurrences found in the veins bordering the copper region, so recognized in silver veins, but in the same system of fissures. I know it is the case in instances that fissures were created and that then this quartz with this crystalline texture that I have [928] been telling about, came up in a molten form to fill the fissure, and then afterwards the mineralization came along, but not in all instances; you know I have described two systems of veins of different origin and different characteristics in the same neighborhood. The West Colusa mine is essentially a quartz mine and is one of the original copper bearing lodes explored. Immediately to the south of that is the Leonard and the Minnie Healy, and the adjoining claims in that region where this copper is found in infiltration masses of the altered granite, whereas what might be called the footwall of that entire area, with which Mr. Tom Couch intended to claim all the minerals in existence as far as the Highlands; the footwall and the croppings on the surface show a decided quartz vein and of the earliest period. That is, as I remember it, a typical

(Testimony of Elliott H. Wilson.)

quartz vein. I have not seen it for a great many years now; there are those two occurrences side by side, on the infiltration vein and the other one the vein filling with quartz from below accompanying the minerals. It is very often the case in the blue vein that this infiltration has occurred and that on account of the intense mineralization, the country rock has been subjected to change and has become ore, which was originally a fault fissure, which actually dislocated the Anaconda vein, and which is a fault fissure and now shows in places just simply as a mass of stained ground, clay, that by some subsequent volcanic action, which permitted other solutions to raise, has become one of the pronounced ore bearers of the camp,—secondary ore bearers of the camp, and started as a fault fissure vein; these two classes of vein formations I have referred to retain their separate identity here in this western part of the region but I have not observed that they do in other places where [929] I have observed even, and that, as I have explained, has been due to excessive volcanic actions, which have opened up entire new reservoirs, if you please of ore-bearing solutions, and have even gone so far as to open up the fissures of the original mineral deposits of this region and made parallel depositions in band like structures. In shaft No. 1 I found about a six inch streak of silicified granite, of which quartz is the predominant material, which quartz is very much more largely in excess, due to segregation of that material, than is the mica or other feldspathic constituents; that six-inch streak had a

(Testimony of Elliott H. Wilson.)

slight dip; it is nearly vertical, possibly slightly to the north; I would not call it a vein. A vein is the filling of a fissure; I think that streak came there either as a dyke or as a segregation from the mass of molten matter; if it came there as a dyke it must have come there to fill up an opening that existed, a fissure; dykes fade into veins and one into the other, but we generally make a distinction between the dyke material, which ordinarily is worthless as far as mineral-bearing qualities are concerned, and which is recognized in this instance, and throughout the Butte camp, as having been thrust up into the still hot cracks in the granite, before its final cooling; there was a fissure there to be filled with this material; if it is aplite it would have been a fissure filled with that material; but if it was this segregation from the granite materials, it might occur just as a freak of nature. It would depend on a determination of its mineral constituents with a microscopic examination. If I determined that was granite, I would say it was a segregation rib; if I found on microscopic examination and chemical analysis, if necessary,—if I found that was undoubtedly aplite, why I should say that it was a dyke material, filling a fissure. If you were to tell [930] me that it is altered granite or altered aplite and it is mineralized, I might admit it is a vein; I would be reluctant because of my recollection of this appearance; it does not present the appearance of a vein. I do not think that will increase in width as you go down; there is no selvage on it; it is a frozen, hard, hungry looking rib there and does

(Testimony of Elliott H. Wilson.)

not promise that; it is right close to the surface, but that does not make any difference; the occurrence of vein filling or material,—increase in width as evidence of some movement on the walls,—but it is entirely lacking here in the lines of separation which you might please to term walls. I did not notice any special alteration in Defendants' Exhibit 56; that looks like it might be either a rib of granite or an aplite dyke; this piece has a little grit, which indicates a possible aplite occurrence; it is very silicious; I see some shining particles here that may be iron; I think possibly it is granite. There is a difference between this sample and the unaltered granite I encountered in the country rock,—it is more quartzzy, not vein quartz, because silica and quartz have the same chemical constituents and we have been talking about vein quartz as distinguished from silica. We find the silicon of quartz in vein filling sometimes, as the remnant of the disintegration of the granite. On the north and west side of the shaft aplite appeared and on the south side the soft granite; I think the aplite is in there as a dyke, so there must have been a fissure in there; the strike of that fissure was quite irregular; it had a general east and west strike; where the aplite and granite came together the character of the material was frozen; there is no gouge such as accompanies vein matter, vein filling, and it bears out the generally accepted [931] belief that aplite was injected from below into the fissures of the granite while it was still in a very hot state; gouge is the soft, soapy matter that you find in the

(Testimony of Elliott H. Wilson.)

walls of a vein, brought there by the movement of the walls of the vein, but actually by the decomposition of the feldspars in the granite and forming clay; you would not expect much of that material right at the surface opening; that movement would still be shown at the apex, because while an apex now has probably been worn down hundreds of feet by erosion, and the present apex is not the apex of the apex of the original deposit.

Defendants' Exhibit 31 is quartz material largely; I think that is an altered granite. I think I detect some of the feldspar minerals left in it, but it is almost silica,—quartz; if originally granite, it has been altered; I detect that it is altered at least to the extent that there are none of the mica in it. The alteration of the granite in these veins such as the Minnie Healy, has left a residue of quartz, and the granite material, excepting generally mica, but in the veins such as the Anaconda and the interlocking crystals of quartz are very generally found, and it is conceded, or thought generally, or admitted generally, that they are deposited very slowly from ascending solutions; if I saw this material in a fissure I might locate the ground and hold it until I satisfied myself that there was worth while spending some money; if it was included within the limits of a vein which had selvage and showed some promise of continuing in depth, or in distance, I might hang on to it, but it is pretty hungry looking stuff. By vein structure I mean walls, selvages, especially minerals that would assay or have some promise of commercial value. [932]

(Testimony of Elliott H. Wilson.)

Exhibit 98 is iron-stained quartz or silica, in which I do not detect, from a cursory examination anything of the feldspars, which might put it along the altered granites; it is silica, or quartz, iron stained; there is a good deal of grit in it that possibly may be aplite; I do not see any of the crystals remaining of the feldspars, nor do I see any evidences of any remains of the micas, so it is almost all silica,—almost pure quartz, but not vein quartz; this sample shows that it is an aplite,—it is silicious; it is not material such as you would ordinarily find as vein filling in this camp, among the best class of veins; I have seen aplite that is mineralized, and especially as ore, here within the boundaries of a vein, but it is generally very hungry, and I never, in any instance that I know of, never has been mined from choice; when workings have been extended cutting others of this, instead of putting it into waste, they shipped it; if I saw this material in a fissure I would have to study its occurrences to pass any opinion upon its value; undoubtedly there is some iron in it.

Thus far in the samples I have inspected here I have not seen any specimen of vein quartz. In Exhibit No. 102 I think I detect the remains of the old granite structure,—granite altered probably and mineralized slightly with chrysocolla. It might be vein matter; here I see some remnants of the mica minerals; there is one piece of altered granite with some remains of mica; in that is another piece of mineralized aplite. In the infiltration of ores, such as I cited as having seen in the Minnie Healy, it is not

(Testimony of Elliott H. Wilson.)

absolutely necessary to have vein quartz there, and it is very sparingly in that great mass of material in which the Minnie Healy ore bodies exist. That is mineralized to some extent; I have seen granite horses within [933] the veins themselves that was in doubt,—would be classed as partly decomposed, or partly altered rather,—which would be probably regarded as a portion of the vein, especially if it was slightly mineralized; the fault fissure might become a vein fissure in time, as I cited in the case of the blue vein here,—has certainly become a mineral vein of value; from the original worthless fault material, it has been impregnated with newer solutions and become a mineral vein. The fault fissure in this case might have ore in it, as I observed there in several of the fault platings near the east end of the ground in question, but it would have one important difference from what I would regard as a vein, which is one that a miner would locate and prosecute work upon, with a reasonable hope of discovering ores of consequence. If I find a fissure and it contains altered material mineralized it would be a vein, but not a vein possibly that was contemplated by the act of Congress offering its conditions for the sale of land; for example, if I found an undoubted aplite dyke, though it may be stained and generally mineralized, in view of the knowledge I have of the ground, I would not, as a miner, recommend or undertake its development in the hope of finding ore, where it is known to have had its origin as this is almost proved to have had, from meteoric waters. I would locate

(Testimony of Elliott H. Wilson.)

the fissure I encountered in the Mullins tunnel and in the cross-cut of the upper tunnel No. 31. I have seen material such as we have been inspecting here in the Mullins vein, and I have explained that I consider it, without much question,—that the original minerals of the Mullins vein were probably leached out, as is the case in all the veins in this country to varying depths, and these solutions coming down the hill-sides have gotten into that and replaced in part, as [934] they have in the joint planes, the mineral contents, in a different form from that which probably the Mullins vein originally contained. I do not know whether they descended deep enough in their workings to get the sulphide minerals in that ground or not, but with a vein of that structure and appearance, I would expect that we would have the original sulphide minerals with depth there, as we found them in the Amazon fissure,—east and west fissure.

Exhibit 97 is highly silicified aplite as nearly as I can determine; there is very little alteration in aplite as I have ever observed, comparing it with that of granite; I see also some apparently altered granite here.

I think Defendants' Exhibit 95 is aplite; I am not sure whether the other pieces are without a closer examination to see whether there is any of the remains there because aplite and granite is quite similar,—just the same chemical ingredients; and I should judge from its texture and the absence of glassy quartz especially, that it is aplite; the alteration of the aplite is there very, very small, in aplite. Ob-

(Testimony of Elliott H. Wilson.)

servances I have seen—now, I find some apparent remains of micaceous materials in this, showing it may be altered granite in part, but there is certainly aplite included in that specimen. I have seen material like this Exhibit 97 in fissures,—altered granite would be shown there. Those veins at and near the surface may not give any evidence of copper mineralization, simply an iron stain, and in depth produce copper in large quantities, but the residue of those veins in addition to the iron, the copper having been leached out, has always carried silver, and sight gold values, which would be determined by assay, and which would not be determined by a casual inspection of such specimens [935] as that exhibited affords. I would not say there is copper in that sample, because none of those workings I observed there were deep enough to prevent the oxidation, and if there was copper, it might have been carried down to much greater depth. There is nothing in there that I can detect as copper. I would be willing to bet ten dollars there was no copper in there; I would not be able to make a guess as to silver; it don't have any of the appearance of silver minerals. There seems to have been somewhat more of a crushing in sample 97, which has admitted surface iron solutions probably. There is some iron content visible and very sparingly in sample 95, while there is considerably more in sample 97. I am quite positively sure that I detected this mica in the granite piece I spoke of; I detect a glistening point there that suggested the existence of mica, and therefore suggested the possi-

(Testimony of Elliott H. Wilson.)

bility that it was an altered granite. In the one instance you have altered aplite or granite and in the other instance you have an unaltered aplite; the alteration of the aplite or the granite is effected by the oxidation of the iron containing minerals, possibly some of the feldspars, to a more limited extent; I do not think it would be subjected to those influences on the dump, but I have stated that a man cannot make up his mind in regard to those matters and answer you fully and satisfactorily, without an inspection of the premises and the environment in which the rock occurs. In the case of a dyke you have a fissure likewise; and you asked me whether it would require the occurrence of such material in a fissure to have such observed action,—the crushing action and alteration,—partial mineralization, if you will, but in addition to that you can have an eruptive dyke that had broken in the rocks and in its neighborhood and outside [936] of the fissure and still have subjected that granite mass, or aplite mass, if you will, to atmospheric agencies, which gives alteration. If I saw that sample 97 in a fissure I might call it vein matter; I would want to make some estimate as to possible result of development in depth, before it would be a lode or vein within the meaning of the Montana statute, or the laws of the United States, or the decisions of Courts defining and settling those measures in a measure. You have to remove about a hundred and fifty cubic feet of earth or material to expose a lead in order to make a location, but you have in addition to expose one well defined wall, but within the time

(Testimony of Elliott H. Wilson.)

prescribed in an exposure of that kind you are not given an opportunity to examine whether it is going to be a paying proposition; you would have to take your chance on that, but in that time I would certainly find out whether there was any mineral contents or assays of mineral that would warrant me to pay for the recording notice. I saw material similar to sample 97 in several of the openings; in the south cross-cut of tunnel No. 30 it was very generally aplite; I have noticed the course of a vein in the south cross-cut,—of a vein,—now I have marked it a slip. There are one or two such slips in the twelve feet between the vein working in the tunnel,—slips that have been caused by earth movements, which have given it a sort of a schistose appearance to this rock. That would suggest that there were simply fractures there due to shearing strains in the aplite mass. The granite was the original country rock of that area in discussion, and the dyke material is the aplite, which was supposed to have gotten in there before the complete cooling of the granite mass. Probably this had been pushed in, in all sorts of irregular shapes, as well as ideal dyke ribbon [937] structures; during the process of cooling in the granite, there were incipient fissure formed in the granite, and the aplite containing about the same minerals, was probably forced into it, from the deep-seated sources from which the granite originated; the granite cooled sufficiently so that there could be a cracking of it, and then the aplite came along in a molten condition so as to fill up the cracks; Defendants' Exhibit 25 is

(Testimony of Elliott H. Wilson.)

aplite with some ribs, very highly silicified; it seems to be altered, at least by the deposition of some copper staining.

Exhibit 96 apparently is altered granite taken from the bottom of the hundred and ten foot shaft, I was given to understand; that was taken out of a fault fissure; if it had a little more water, it would be a very fine quality of mud clay; it is silicate of aluminum; the granite, evidently, was subjected to some altering agencies; the feldspar seems to be greatly removed, and the new combinations made by which the aluminum and feldspar became, from its greater assimilation and these alkaline qualities to the quartz of the granite, made the material known commonly as clay or silicate of aluminum; these ordinary waters have some carbonic acid and they have some free oxygen, and have possibilities of setting up chemical changes within the rock; I saw neither of the walls of the fissure which existed in shaft 21; I am not able to give any idea as to the width of the fissure. There is a slight staining left in this ground. In tunnel No. 35 I have recorded an iron, a slight iron staining of the few feet of exposure of bedrock; there was only five or six feet of bedrock exposed. The bedrock in shaft 19 is colored with iron. The country rock in tunnel No. 30 has no discoloration, and no green coloring in the material I encountered in the bottom of shaft 21, and I did not notice any in the bottom [938] of shafts 1 and 2. There was some very slight copper discoloration of the material in shaft No. 9, I think in those streaks, but it was prin-

(Testimony of Elliott H. Wilson.)

cipally iron, as I recollect. The Vesuvius workings had discoloration, which are a little east of the ground in controversy; there is no fault there,—that is, one of those joint planes. I told you of a fault that was visible at the Six O'Clock mine, two hundred feet wide, which had a northerly and southerly strike. There were a number of those interior fractures within the boundaries of a huge fault. The Mullins vein presents all the characteristics of a fissure vein, rent by volcanic action; the cooling cracks are just the consequences of the cooling of the granite mass along irregular planes of fracture, generally maintaining straight lines. I imagine all the veins I have observed are traceable to the result of volcanic action,—the blue vein and the Rarus fault, and certainly all of the veins in the outlying districts. The cracks disclosed in the Vesuvius workings originally were not any thicker than a sheet of paper; these solutions have got down and made room for the deposition of minerals,—chrysocolla and so forth; and they present now an alteration of the appearance in comparison with an unaltered country rock as having more width than that, because there is staining to a limited extent of both sides of the little cooling breaks by the descending waters carrying copper. In the case of volcanic fissures, I have seen them very small in width, where the movement has brought hanging and footwall together in veins of very considerable width, that subsequent sliding down of the hanging-wall has brought the foot and the hanging together, and I have seen the trace of that vein only

(Testimony of Elliott H. Wilson.)

marked by a very narrow streak; the least width I would expect in the case of a fissure [939] occasioned by volcanic action would be very small, and just the same way in a fissure of that kind the mineralizing solution may take hold of the walls and extend the width of the fissure; I did not notice any fissure disclosed in the workings of the Vesuvius, but there is evidence there that there is a crack by the cooling of the granite, by reason of the action of mineralizing fluids, and its width has been increased to half an inch, and it might be two hundred feet in length; I observed the coloring in the Vesuvius in the cross-cut, especially south of the shaft, and in the neighborhood of those cracks; the cracks are very frequent throughout the extent of the workings.

Redirect Examination.

(By Judge BOURQUIN.)

The WITNESS.—With reference to the places where the aplite dykes were found to be mineralized, the one that I recalled and the only one that I had any occasion to inspect, was in a raise in the Nipper in which an aplite dyke had been intersected by a vein, and in which there was a slight mineralization of the aplite on each side of it; there were very fine ores deposited in the fissure in the neighborhood of the granite, but the aplite did not take the same degree of mineralization; that ore, as broken, was actually mixed with the other ore and shipped, because the expense was necessarily incurred to mine it, but stopes were not prosecuted upon it; it was at points where the vein crossed the dyke; the presence of the aplite

(Testimony of Elliott H. Wilson.)

on the vein surface reduced it from a content of possibly six or eight per cent in the adjoining granite area, bounding the dyke, to probably one per cent in the broken aplite; I know of no instance in this district where aplite dykes have been [940] mined along the strike for their mineral content. The wonderful deposit of ore in the Minnie Healy was caused by replacement, and there was a succession of fractures, marked by iron filling, six or eight inches wide, that looked like they were defined veins, varying strike and varying in dip, and made a network of fissuring up through which the solutions had come at different times of volcanic activity, in all probability, and which solutions had deposited their copper content outside of the walls. I observed the presence of copper in the Hornet cross-cut, in the granite. Where we saw the green appearance of copper it was by replacement from a different source than that spoken of in the Minnie Healy; sometimes it had appreciable thicknesses of the copper, and it was considerably more than a stain; the mineralization was confined to those two occurrences; through the country there was a slight stain at points of the country rock itself, unaltered granite; that appearance of copper in the country rock itself was caused by staining covering the mass of unaltered granite which was porous to a degree to the solutions that were ambling around there, around the cracks. In the upper cross-cut from the Mullins tunnel to the Hornet shaft the specimens would afford commercial ore of extraordinary richness, but it occurred as specimens, not in

(Testimony of Elliott H. Wilson.)

masses that could be mined, in my opinion, economically at the present price of copper, and which could only be mined in considering the continuation of the appearances were sufficient to justify the erection of suitable plants, which could only be mined by getting into solution in some way the chrysocolla and mining the mass with a pump. The cuprite in the Hornet cross-cut was generally in bunches, sometimes adjacent to the cooling cracks; occasionally small kidneys, but occasionally streaks of well [941] defined strike and dips of a very limited extent, as the one which I referred to in the lower cross-cut connecting the bottom of the Hornet shaft with the Mullins vein. There was a very slight green staining in tunnel 31 beyond the footwall and toward the face; it was not as noticeable as in many other places, notably in the Vesuvius. I observed from my examination the faulting in the vein in the Mullins tunnel as laid down on Complainant's Exhibit 15, and I observed faults in other portions of the ground in controversy and on the B. & B. placer; presuming that the faults were normal, and the drop was generally westward, vertical drops, or nearly vertical drops caused by that fault would drop the portion looking west normal to the north in a sixty degree dipping vein, south dipping vein, throw them to the north going west; there would be no way to determine how much the displacement would be where the faults are not exposed, in rocks of this character in addition to the displacement by the vertical faults, there have been observations made by myself in the Amazon of a rake looking

(Testimony of Elliott H. Wilson.)

west, indicating a horizontal movement to the north in planes, recorded in planes along the clay content, within such fault. In view of the situation as I know it on the Butte and Boston placer, and the vein as exposed in the Mullins tunnel, there could be no reasonable forecast as to where the vein would be on its strike, when I would get out as far as shaft 19, in the absence of exposure west of the Mullins tunnel; there may have been other faults there that would have some effect.

Recross-examination.

(By General NOLAN.)

The WITNESS.—That is true in reference to any vein; you cannot tell anything about it until you have exposed the vein; [942] in a faulted country especially, you cannot predict with any certainty the continuation, the position of the continuation of the vein. The fault crossing this Mullins vein at right angles would have a tendency to throw the vein to the north, if the fault was normal and as is generally believed, the fault had dropped the west country as compared to the eastern part of it. In this particular case you have the dip of this Mullins vein to the south. I am assuming that the fault is nearly vertical and which would have no effect from its dip, but the dropping of the extension of the vein which has a southerly dip, would come down this way, dropping to the west,—would drop to the north, you see. Normal faults are those where the hanging-wall slips downward and in contradiction to that is another system of faults which are very rare, in

(Testimony of Elliott H. Wilson.)

which the hanging-wall slips up. Now, the general understanding and belief is, from what observations have been made, that the country looking west had been dropped generally by this fault, but there are inferior fractures that may have given it, for limited distances, other directions. The material in the cross-cut, outside of the fissure as it is disclosed in the Mullins tunnel, is unaltered country rock to a great extent. The material in the cross-cut is generally aplite; we find that the solutions must have altered the cooling cracks to a degree outside of the actual planes. Both those occurrences there that disclose between the Mullins tunnel and the Gulf discovery where the most noticeable mineralization has been along the fault plane, and the other mineralization, which is principally chrysocolla, which has been along the joint planes and which constitutes the material seen in the shaft,—in the Hornet shaft. The material in the territory we are now referring to is very [943] generally unaltered; the country rock at that place is granite. I do not recollect any aplite within the Hornet shaft.

(Signed before examiner February 2, 1912.)

[Testimony of Julius H. Warner, for Plaintiff.]

[944] JULIUS H. WARNER, a witness duly called and sworn on behalf of the complainants, testified as follows:

Direct Examination.

(By Mr. SHELTON.)

The WITNESS.—My name is Julius H. Warner; my occupation is mining geologist. I am mining

(Testimony of Julius H. Warner.)

geologist at the present time of the East Butte Copper Mining Company; Butte has been my home for nearly four years, and I have held that position continuously since coming to Butte. I have followed the occupation of mining geologist since graduating from the University of Wisconsin in 1904. I have examined mines in the Butte district outside of the Pittsmont mine; I have examined the Ballaklava, the Tuolumne, the Butte Alex Scott; I have also had opportunity to study a considerable area immediately adjacent to the Ballaklava and Tuolumne properties. I have made an examination of the ground in controversy, first in December, shortly before Christmas, and have made various examinations of this ground during January; I have examined all of the openings in the ground included in the Butte and Boston placer, and also the so-called Vesuvius workings directly to the east; in general this district is covered with wash. The rock formation as disclosed by the various openings are granite and aplite; there is certainly one vein in this section, owing its origin to the sources and methods of deposition to which the principal productive veins of the Butte camp owe their source and method of deposition. Aside from this, there are various faults and fractures exposed in the openings; there is, further, a very wide spread and irregular staining of the country by chrysocolla and further deposition of chrysocolla and cuprite in various [945] joint planes, fractures and faults. The mode of deposition of this chrysocolla and cuprite is very evident,

(Testimony of Julius H. Warner.)

as having been formed by the agencies of ordinary meteoric waters, under ordinary conditions of temperature and pressure. This deposition has taken place principally,—I will not say principally,—I will say partially as a filling in various fractures, and I think further that it has taken place as a partial replacement of certain of the constituent minerals of the rock formation, particularly the feldspars in the granite, and also the feldspars in the aplite. I speak of one vein that has been formed similarly to the productive veins of the Butte camp. No doubt in this case, up to the present time, the mode of deposition of the Butte ores has been pretty fully brought out and before going on with my detailed testimony, I would like particularly to draw attention to certain characteristic alterations of the country rock that accompany the productive veins of this camp. The granite included in the type copper-bearing veins in this camp and also the granite walls, have undergone a very characteristic alteration adjacent to the veins; this alteration is commonly spoken of in this camp as pyritization and consists essentially of an alteration of the fresh granite, containing granite and mica and feldspar and quartz, to an altered rock, containing as its chief constituent senicite quartz and aplite. The resultant altered rock is a light colored, rather chalky appearing rock, strikingly different from the fresh, unaltered granite; in taking up the individual openings that I examined, I will begin with the deep shaft on the northerly portion of this ground. It is num-

(Testimony of Julius H. Warner.)

bered 21, I believe. The bottom of this shaft is almost entirely in very characteristic north and south striking fault gouge material. To the southeast corner, the granite does not represent,—does not indicate the amount of [946] change that is noted in most of the remainder of the shaft of the rock disclosed in the bottom of the shaft. I would not be certain that this fault zone did not extend somewhat to the east of the bottom of this shaft. It certainly extends to the west on the bottom.

Going to shafts 1 and 2, adjacent to the Olivia discovery. Now, first, there is a tunnel No. 30, about thirty feet of which at the face is in rock in place. This rock is typical aplite of this section, very silicious. There are various joint planes and well-defined walls disclosed here, but there are no veins and no faults that I would consider worthy of mapping as geological features.

Proceeding to shaft No. 1, adjacent to the Olivia discovery, this shaft is approximately eighteen feet deep. The lower portion of the shaft discloses granite with various silicious ribs. There is no ledge and no fault in this shaft.

Shaft No. 2 is in ground very similar to that disclosed in shaft No. 1. There is, however, some aplite in shaft No. 2. There is no vein and no other geological feature of interest.

Going southeasterly from this point to tunnel No. 31, and entering this tunnel No. 31, the wash continued to a point somewhat beyond the first cross-cut north. In the second cross-cut north, a distance of

(Testimony of Julius H. Warner.)

about twenty feet north of the tunnel, a well-defined fracture zone following an aplite dyke is evidenced twelve inches to fifteen inches in width. Along this zone of fracture there has been a considerable deposition of chrysocolla. The immediate hanging-wall is granite; the immediate footwall is aplite. As to this mineralization, there is evidence to me that it is anything farther than the surface infiltration along this zone of chrysocolla and iron [947] oxide. North of this first fracture zone, a distance of about ten feet, is an entirely similar zone as to present character and extent. The first one of these showings mentioned strikes northeasterly, north seventy-seven degrees east, and dips to the north seventy-six degrees. The second showing mentioned strikes more nearly east and west and has a northerly dip of eighty degrees. Very near to the northerly one of these showings mentioned, perhaps two feet south of it, is a one-inch to two-inch discoloration, very similar to the northerly one of these two mentioned. South of the first important fracture zone mentioned, there is also, at a distance of about four feet, a similar aplite dyke, shattered, iron stained, with some chrysocolla, very small in size, only about one inch, for which reason I have described it in point of importance rather than in point of meeting it in going northward in this cross-cut. The principal rock formation in this cross-cut is granite. There is also aplite in this cross-cut. Following eastwardly from this cross-cut in the tunnel, at a distance of about perhaps thirty feet from the cross-cut, an aplite dyke

(Testimony of Julius H. Warner.)

is encountered about eighteen inches in width, made up principally of quartz, but containing a very considerable amount of chrysocolla. This occurrence can be traced along the tunnel for a further distance of about twenty feet. The dip here is to the north. At a point north fifty feet from the cross-cut recently mentioned, a very well defined fault cuts across the cross-cut, striking a little west of north, with an almost vertical dip,—did I say strike across the cross-cut,—I would say striking across the tunnel. There is six or eight inches of gouge matter in this fault, also considerable chrysocolla and some cuprite. Going eastward from this fault, say for a distance of about twelve feet, there is another smaller fault slip crossing this tunnel, [948] with a strike of north forty west, dipping slightly to the east. Continuing to the face of this tunnel, a slip is noted striking a little north of west and dipping at a rather flat angle to the north, at about fifty degrees. Along this slip there is some chrysocolla stain. Near the end of this tunnel there is a cross-cut going south a distance of about thirteen feet. About half-way to the face of this cross-cut is a fault slip striking north sixty-two degrees east, and dipping sixty-four degrees to the north. This is a light slip, under one-fourth inch in width, carrying some copper staining. It may be stated that particularly in the eastern portion of this tunnel, there is a rather consistent staining of the granite by chrysocolla. I would think that the same occurrence was not disclosed in any

(Testimony of Julius H. Warner.)

of the workings easterly of this first fault of which I spoke.

Leaving this tunnel 31 and going to the Rabbit discovery,—the Rabbit discovery workings consist of a shaft about twelve feet in depth with a short cross-cut to the west, perhaps four feet in length; the country rock is encountered in the bottom of this shaft and the cross-cut, coming up perhaps two or three feet above the bottom. In the western face of this cross-cut is discernible one or two inches of discolored material, principally aplite, chrysocolla and iron oxide. I could observe no extension of that showing across the bottom of that shaft.

Continuing to shaft No. 9, there is here a timbered shaft, about forty feet in depth, marked on Complainant's map No. 14; four sets from the top there is a cross-cut to the north from this shaft; the sill of this cross-cut would be about twenty-five feet below the collar of this shaft. This cross-cut is about eleven feet in length, and at a distance about four feet [949] from the shaft timbers, a very well-defined slip is noted crossing the cross-cut, striking north seventy-nine west and dipping seventy-five degrees to the south. In this slip there is two inches to four inches of crushed and altered granite, with some iron oxide and some chrysocolla; in certain portions it can be noticed that it follows along a small aplite dyke. At a distance from the shaft timbers, of about eight feet is discernible on the west side of the cross-cut,—is a quite similar streak striking east and west and dipping eighty-two degrees north.

(Testimony of Julius H. Warner.)

Adjacent to this slip, there is perhaps a foot of quite altered granite and in the slip there is some chrysocolla and some iron oxide. As regards the alteration, notable in the cross-cut adjacent to these two slips, there is nothing to indicate that this alteration has been caused by agencies other than descending meteoric waters. At a depth of thirty-five feet from the collar, there is a considerable cave of ground to the north of the shaft, extending back perhaps ten feet from the shaft, having the length of the shaft, and in the back of this cave there is discernible,—there is what I have not any doubt is a downward continuation of the first slip encountered in the cross-cut above; this appearance in the back is not over six feet below the appearance of the slip in the sill of the cross-cut above. It is noted that in the back of the cave this slip has no mineralization and is simply a clay slip. At the northwesterly side of this cave, there is a well-defined fault slip, striking north fifteen degrees east, and dipping very steeply, perhaps eighty-eight degrees to the northwest. On the easterly side in this cave is a light slip striking a little west of north. This entire caved ground is traversed by numerous small slips, unworthy of mapping. In the [950] fourth set from the top, the lagging has been taken off from the eastern end of the shaft and granite country rock is disclosed with various highly silicious ribs. The granite is comparatively fresh, except that it is perhaps somewhat disintegrated. There is no vein disclosed in the east wall of that shaft as seen. It is my remembrance

(Testimony of Julius H. Warner.)

that either in the back or upper portion of this set, or in the lower portion of the third, it is perhaps discernible through the openings in the lagging. I noted the juncture of the country rock in place and the wash.

Continuing from shaft to the Vesuvius workings, I examined the Vesuvius workings. They consist of a shaft about forty feet in depth, with cross-cuts both north and south, and a short distance to the south, a drift following a well defined wall. A distance of nearly thirty feet southeast of the Vesuvius shaft, a well defined wall is encountered, striking a little north of east, with a nearly vertical dip. At some points there is notable a small aplite dyke, which is one,—or both walls of this slip,—there is iron oxide and chrysocolla deposited along this slip and there is some alteration of the granite, such as is caused by the ordinary weathering of surface waters. There is discernible to me no alteration here, ascribable to other agencies. Going next to the,—well, just a moment. I have got two very subordinate slips in this cross-cut one crossing the shaft and another crossing nearer the north end of the cross-cut,—mere slips and hardly deserve mention. It may be further noted that throughout this cross-cut, there is a very general discoloration of the feldspars in the granite by chrysocolla, which gives it a green color; it can be found in any section of five feet in length. There may be some portions that have not received this discoloration, but it is rather commonly shown throughout this cross-cut. [951] I examined and de-

(Testimony of Julius H. Warner.)

scribed the portion of the cross-cut north of the Vesuvius shaft in a general manner; I said it extended north through granite that was more or less stained with chrysocolla; there is, a short distance from the north end of this cross, about fifteen feet, a slip striking north fifty-five degrees east, and dipping eighty-three degrees to the north, with some chrysocolla and iron oxide following down the dip; I have not given that slip a width; it is very small in size; knowing the general way in which I speak of slips, I would say it was under one-half inch in width.

Going from the Vesuvius workings to the Mullins tunnel; the Mullins tunnel discloses in its face and for a considerable distance to the west, a well-defined vein having these characteristics which we find in the surface appearance of the productive copper veins in the Butte camp. At the eastern face of this tunnel, the Mullins vein is four inches to ten inches in width, made up essentially of highly altered rock, now a chalky material, more or less largely stained with iron oxide. There is also chrysocolla in this ledge. The walls are very well defined, being granite on both foot and hanging, in which the micas and feldspars are very fresh in evidence. There is some staining of the granite by chrysocolla, the entire width of this tunnel. At a distance of about fourteen feet from the face, a fault crosses the tunnel, striking north twenty-five degrees west, dipping about eighty degrees to the west, being composed of crushed gouge, one inch to three inches in width. This fault offsets the vein somewhat. Coming west

(Testimony of Julius H. Warner.)

from this fault, the vein appears typically in the tunnel, but at a short distance west, perhaps ten feet, the back is lagged and the floor is covered with muck, and a good section of the vein cannot [952] be obtained until the Mullins winze is reached. By going down in the first set below the tunnel, a very good section of the vein can again be noticed. The vein here is again about two feet wide, similar to the vein where it is described further to the east. Continuing still westerly, the lagging in the back and muck on the floor obscures the vein pretty effectually, until a short distance west of the Hornet cross-cut. Here again the vein is noted in characteristic occurrence about three feet wide. At a point about nine feet west of the Hornet cross-cut, the fault crosses the tunnel and displaces the vein somewhat. The vein continues from this fault again westerly a distance of perhaps ten feet, when it is lost sight of, due to lagged back, and from this point westerly I could not say what may be the disposition of this vein.

Crossing from the level of the Mullins tunnel through the Hornet cross-cut toward the Hornet Discovery shaft, the country rock encountered is granite, somewhat disintegrated, owing to its nearness to the wash. There are various joint planes noted in this cross-cut, with a somewhat parallel dip and strike, striking across the direction of the cross-cut and dipping from twenty to forty degrees to the north. Along these slips, it is noted that there is a tendency for chrysocolla to segregate to a greater extent than in the country rock, although there is some discolora-

(Testimony of Julius H. Warner.)

tion of much of the country rock in this cross-cut by chrysocolla.

Reaching the Hornet Discovery shaft, I find at least three flat lying joint planes, dipping to the north at flat angles, along which there is some deposition of chrysocolla, and also find at least two joint planes with different strike and dip than the others described with the same occurrence of chrysocolla.

[953] Going westward from the bottom of the Hornet Discovery shaft to the Mullins vein, the country rock—going northward—the country rock encountered is similar to that encountered in the cross-cut above. It has not been quite so much disintegrated. There are noted at lease three flat lying joint planes, along which there has been deposited some chrysocolla and cuprite. The Mullins vein is again disclosed in the lower working, similar in all respects to the occurrence of the Mullins vein in the main Mullins tunnel. A drift has been driven on the Mullins vein a distance of about twenty-five feet. There is one very notable fault offsetting this vein somewhat, striking a trifle east of north and dipping about eighty-five degrees to the east. This fault follows along an aplite dyke a part of its extent. It is perhaps four or five inches in width, filled with clay gouge matter, and also contains considerable chrysocolla. There is also a short cross-cut southwesterly from the bottom of the Hornet Discovery shaft. This cross-cut is in granite. There is one well-defined slip crossing it—about half way between the bottom of the Hornet Discovery

(Testimony of Julius H. Warner.)

shaft and the face of this cross-cut, striking north thirty-five west, about vertical in dip. In the face of the lower drift on the Mullins' vein the hanging-wall is very clearly evidenced. I would not be so sure as to the footwall. The granite appears to be pretty well altered clear to the footwall. The main ledge matter is clearly evidenced in this face by perhaps at least two feet of bleached altered granite carrying heavy iron oxide, but the granite immediately to the foot of this characteristic vein material is somewhat altered, and I would not be certain that the vein might not extend somewhat further into the foot. This drift has been driven in just [954] about the width of the vein. There has been perhaps a little stoping. The floor is pretty well covered, and as you go to the face, you do not know just how high that drift may be. I would expect that there had been some stoping in the upper portion, toward the face of the drift. There is a raise connecting the western portion of the drift with the tunnel which has been run on the vein; right in the eastern portion of the raise the walls are distinguished; the western portion of this raise follows along the fault; *the western portion of this raise follows along the fault*. I have noted that fault from the lower drift to the bottom of the Mullins tunnel, following up the west side of this raise. In that sense I have noted it in the bottom of the Mullins tunnel, but in the first examination of the Mullins tunnel and without knowledge of the conditions below, I did not observe that fault. I determined

(Testimony of Julius H. Warner.)

the position of the raise as it enters the Mullins tunnel at the mouth, to the Hornet cross-cut, so the fault would follow along the floor of the Hornet cross-cut for a short distance; in the drift on the Mullins vein I observed this fault nearly ten feet south of the eastern boundary of the Mullins tunnel—I would say southern boundary. Chrysocolla and cuprite do not occur in any considerable quantity in the two cross-cuts running northerly from the Hornet shaft; there was a somewhat general discoloration of the country rock with chrysocolla. Along some minor joint slips—there was noted a little heavier discoloration of chrysocolla and some cuprite. The general mass of the material is granite, and there were some very small narrow stringers of aplite; the general mass of the material in the Hornet shaft is granite; the occurrence of chrysocolla is usually in the form of the stain, to some extent as a partial replacement of feldspars. The general [955] distribution of the chrysocolla is quite extensive. The mass of the granite is very slightly affected by the chrysocolla quantitatively. The farthest south the Mullins vein occurs is in the lower drift, near the west end of the lower drift. I can tell you approximately how far that would be from the corner of the shaft, if that is what you wish to learn; it is found at the end of the cross-cut running north, about eighteen feet between the Hornet shaft and the most southerly portion of the Mullins vein. The hanging-wall at that place is exposed.

Going to tunnel 37, the cross-cut represented in

(Testimony of Julius H. Warner.)

green, I was able to examine the northerly cross-cut and the eastern portion of the tunnel. To the west and to the southeast, the ground was caved and filled and I was not able to examine it. The northerly cross-cut follows along the top of the bedrock. Bedrock exists, perhaps, about two feet above the floor of the cross-cut. It is entirely aplite; the easterly portion of the tunnel is also aplite. There is some local discoloration of the aplite by chrysocolla. Here this discoloration is slighter than in the cases that I have cited, where the discoloration is chiefly in granite—a green stain without dimensional properties. That is a little vague. I mean to imply that this discoloration would not indicate a vein, neither does it follow fault slips. Leaving this section, I next entered and examined a tunnel to the southwest, on this map known as No. 36. The easterly seventy-five feet is in bedrock, principally granite, with some aplite. There are various north and south slips, slight in extent and of no particular importance. There is no vein there. Leaving this tunnel, I next examined the tunnel 35. This is almost entirely in wash. There is perhaps ten or twelve feet at the eastern face that is in bedrock—granite and [956] There are no structures here worthy of mapping—no indications of veins, no indications of faults; the general mass is granite and aplite. Continuing southwesterly, I also examined a deep shaft, No. 19. This shaft is nearly a hundred feet in depth, I would judge. For the bottom six feet, perhaps, this shaft is in bedrock. It carries a very strong fault zone,

(Testimony of Julius H. Warner.)

crossing the bedrock in the bottom of this shaft a little west of north. There are two rather distinct planes in this fault zone, parallel to one another, evidently due to the same forces. They dip at a rather flat angle to the east—that is, I could obtain dips from twenty to fifty degrees to the east. The bottom of the shaft is filled with broken gouge matter and the shaft is considerably timbered. Somewhat variant dips and strikes may be obtained, but as to their general northerly and southerly strike and easterly dip, there is no question. Leaving this shaft, I also examined No. 32 tunnel. This tunnel is in wash, with the exception of about fifty feet. There are three at least north and south slips in this tunnel and a northeasterly and southwesterly slip. This bedrock here is both granite and aplite. That completes my account of the observations. In the north cross-cut of tunnel 31 there has been deposition of chrysocolla along certain fracture zones. These zones, from a generic standpoint, I would not think are veins such as are followed successfully in the Butte camp. At the particular point noticed, in so far as they have indications of value, that might lead a miner to follow them with the expectation of finding ore—producing ore—they might be considered veins. I would say they would justify a miner in following them; right in that cross-cut I think he might take out some ore, and similar conditions might exist at that elevation to some extent in both [957] directions. I would not expect that condition to continue to any great depth. I am connected with the

(Testimony of Julius H. Warner.)

East Butte Copper Mining Company, the company that operates the Pittsmont mine. To my knowledge when I was familiar with the mine, they were actually working at least ten veins, and there were numerous other veins that were not being worked. Some of them have been worked, some of them too low grade to work; some of them perhaps might be worked later; the general strike is easterly and westerly, varying from north seventy west to north sixty east. In the western portion of the mine, the chief vein is the Silver Bow vein, its strike is about north seventy west. I know the Donner vein; the Donner has been recognized in an east and west direction for a distance of about three thousand feet; the extreme easterly end of the drift development in the Donner is on the twelve hundred. This drift extends to within four hundred and thirty-eight feet of the east boundary line—four hundred and thirty-eight feet west of the east boundary line. The vein is developed to the eight hundred foot level a short distance west of this point. The greatest vertical depth of the Donner vein in vertical extent of the Donner—the greatest extent of the development of the Donner vein is in this easterly portion. The Donner has been stoped to some point above the eight hundred level and has been opened up and drifted upon at the eight hundred, ten hundred, twelve hundred and thirteen fifty levels. Below the thirteen fifty, no development has been done on the Donner. Below the twelve hundred, this ground is now filled with water, and from hearsay evidence—

(Testimony of Julius H. Warner.)

By General NOLAN.—Just a moment. Object to that as incompetent.

Q. What is the hearsay evidence? Is that the map of the [958] underground workings—the map of the underground workings of the Pittsmont—is that the source of your information?

A. As to the existence of the Donner to the thirteen fifty. As to the existence of the Donner below the thirteen fifty, my hearsay evidence is based upon the statement of Mr. Andrew Ray, the mine superintendent in charge of this development work.

Q. If that is your information, you can disregard it, and make a calculation of the dip of the vein, taking the vein only down to the twelve hundred foot level.

By General LOGAN.—We shall object to this reference to the map for the purposes named, until it be shown that the map is correct. It is simply hearsay and incompetent.

By Mr. SHELTON.—The map that he has in his hand there, is not the working map of the Pittsmont property.

The WITNESS.—I know of the development of this vein to the twelve hundred and fifty foot level from personal observation; as regards the Donner vein above the eight hundred level, I have seen the stopes some distance above the eight hundred, but I have not see the latest stoping or the highest point reached; making the assumption that there is a departure from the vertical along the dip of the vein of eight feet, and taking the average dip, between

(Testimony of Julius H. Warner.)

the twelve hundred foot level and a point one hundred and forty feet above the eight hundred level, having departure to the south from the eight hundred level of eight feet, I find the average dip to be approximately seventy-four degrees and thirty minutes. Applying the dip obtained to the most easterly drift driven on the Donner vein, which is on the twelve hundred foot level, and projecting this vein to the surface, assuming at this point an east and west strike, would give the point of intersection of the Donner vein at the level of tunnel 31, which is in part estimated, which is estimated. [959] On this basis, the Donner vein would lie five hundred and twenty feet south of the northwest corner of the Butte and Boston placer. The eastward extension of the vein, so projected, would cross the Butte and Boston placer as indicated by this red line (referring to blue print map in hand of witness). (Witness marks point on one of maps, and draws east and west line through that point.) It might vary somewhat from due east and west. (Witness continues line.) I will indicate the line drawn on Complainant's Exhibit No. 14 A-B, at the east and west ends of that line; the red line A-B represents the intersection of the Donner vein with a horizontal plane at an elevation equal to the elevation of tunnel 31, assuming that the average strike of the Donner vein is that as indicated, by drawing a line from the place where the Donner vein is disclosed on the twelve hundred foot level. Drawing a line from that place where the Donner vein is disclosed on the twelve hundred level through the

(Testimony of Julius H. Warner.)

Donner vein at a point one hundred and forty feet above the eight hundred level, assuming that the offset above the eight hundred level is eight feet south of the Donner vein on the eight hundred level, and taking this line of dip in a vertical plane which crosses the Donner on the eight hundred level, at the intersection of eight hundred and thirty drift and eight hundred cross-cut, and assuming and taking this vertical plane at right angles to the average strike of the Donner as evidenced by the drift eight hundred and thirty; following the vein on its apex, it would cross the ground in controversy south of tunnel 31, somewhere near the place where the red line is indicated. I do not think the vein shown in the north cross-cut from tunnel 31 is the same vein as the Donner; the Donner is a real vein, produced by those agencies to which we ascribe the [960] origin of most of the copper veins in this camp. I noticed a difference between the vein on tunnel 31 and the Donner vein; the chief point is that the Donner vein evidences a type of mineralization as stated—noted in the copper veins in Butte. There has been a considerable alteration of the adjacent country rock. The type pyritization of ore I spoke of yesterday, is pretty well evidenced here. There is no evidence of the same alteration and ore deposition noted in the showings in the north cross-cut from tunnel 31. The adjacent country rock in tunnel 31 to the chrysocolla deposits is an essentially fresh granite, only affected by weathering agencies. I believe the Donner vein has been developed in places

(Testimony of Julius H. Warner.)

within the oxidized zone but do not think I ever saw the Donner vein in the oxidized zone. I am familiar with the oxidized zone in the Motheral vein, a short distance north of the Donner. The oxidized zone here shows no copper content. It shows a very heavy amount of iron oxide, some quartz and a white, chalky residual matter derived from the altered granite; I observed no chrysocolla or cuprite. Under present conditions there can be no tracing or connection between the Mullins' vein in a westerly direction as far as the Pittsmont ground. I have read some of Mr. Barker's testimony. I would expect if any strong fault crossed that section in a northerly and southerly direction, and offset any one vein appreciably, it would have a similar effect upon other veins. I am somewhat acquainted with the ground in the Pittsmont mine north of application 888, and know of the existence of veins having an easterly and westerly course and lying north of the Silver Bow vein, on the Butte Hill. There has been extensive development work on the twelve hundred foot level to the north of Application 888, which resulted in the discovery of [961] any of those veins easterly and westerly, but north of shaft No. 3 none of these veins were commercial. They were very strongly mineralized veins on the Butte Hill, but the veins encountered in the ground referred to were not of that character. A vein is a tabular deposit of mineral or mineral-bearing rock in place in the earth's crust, differing materially and separably by definite boundaries from the enclosing rock, and containing such

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indication of value that will justify a miner in following it with the reasonable expectation of finding ore.

Cross-examination.

(By General NOLAN.)

The WITNESS.—I was present when Mr. Winchell was giving his testimony, and I read some of Mr. Barker's testimony, and I read a part of the testimony of Mr. Watson, and I also read the testimony of Williams and Andy Ray. I told Mr. Kemper when he asked me to appear in this case for him,—I went over the ground with him and looked at the ground, and told him I could do so, and that I would charge him twenty-five dollars a day for my time, and it is still an open question whether I will charge for the time spent in reading testimony of witnesses; as a matter of fact I have spent a good deal more time in this case than I expected to when I arranged to appear; I have been interested in reading the testimony of certain of the witnesses in this case; I was preparing myself to meet any contention that will be urged by the defendants here in connection with the establishment of their case. I lived in the State of Wisconsin before I went to college; I attended common school and high school and attended the University of Wisconsin; I have not [962] located any claims in the Butte District; I have located at least eight claims in the Cobalt district, Ontario, for my employers, with the assistance of others; it was largely a matter of trenching the surface material to reach the bedrock, for which purpose I employed the as-

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sistance of others; the conditions there were such that the leads came to the surface and I exercised my judgment as to the surface conditions and concluded to make a relocation; my attention was called by others to these surface mineral conditions sometimes; that is a silver country up there; we had to do with fissure veins up there; I believe this term fissure vein has received rather widespread discussion by eminent geologists with varying opinions upon the term fissure vein, and I hesitated somewhat before expressing myself for this reason. Up there we have a cleft, or a fissure or a break in the earth's crust, with a strike and dip, with the fissures possessing various widths, the widest to my knowledge being about four feet and the narrowest closely approaching no width at all, which would not possess very much mineralized material; I would not locate a fissure of that character; I have located a fissure filled with vein material two inches in width. There are very many characteristics of a vein aside from the width of a fissure that may be part of that vein that you may encounter on the surface of the ground; if I found a fissure of very narrow width, accompanied by certain characteristic rock alterations, filled with certain characteristic vein materials, I would not demand a very wide fissure; if the conditions were right you would not have to have more than a quarter of an inch to locate upon. I am a mining geologist; that is my profession, which is a term that is used to particularly specify a geologist whose chief work is in [963] connection with mining. There are other

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geologists whose chief work may be mapping the rock formation in some section of the country in which there is no mining; in contradistinction to a geologist of that character, the term mining geologist is used. In 1904 for four months during the summer my activities were directed to the explorations in iron ore, and then I went back to college and did some post graduate work, and then I was employed by the State of Wisconsin in State geological surveys; that was geological work in Northern Wisconsin; it consisted of mapping rock formations encountered in the section which we were studying and also paying some considerable attention to the soil; it had nothing to do with mining; and then for two and a half years and until January, 1908, I was in charge of certain development work in Cobalt, and exploration work, where I encountered those so-called fissure veins, and in comparing the vein deposits of Cobalt, Ontario, with the copper deposits of Butte, Montana, there is a very striking difference. Replacement of territory beyond the geological walls of the fissure is a marked characteristic of copper mineralization,—in the chief copper producing districts of the western United States,—you find a fissure where primary mineralizing solutions have replaced and altered the adjacent country rock, and you expect to find some replacement by copper minerals. Where there is copper mineralization as contra-distinguished from silver, you don't necessarily expect to find the replacement mineralization, but it is true generally in the Butte camp; there are very many faults in the Butte camp

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which may carry some copper minerals within themselves, within the walls of the fault, but I do expect that there will be an extensive replacement adjacent to that fault. By reason of the geological [964] conditions here in the Butte camp, there has been a considerable shattering of the granite, adjacent to faults or to veins; it would not be necessary to call upon that shattering to make feasible the alteration of the country rock adjacent to ore-bearing veins; the shattering itself makes feasible the mineralization of the ground beyond the limits of the fissure bounded by geological walls, and I am telling you that such mineralization would be entirely feasible from the same sources without that shattering; in the solid granite there are pore spaces, through which percolating waters can find their way. These waters carrying in solution certain salts react upon the country rock with replacement of which I spoke.

I came to Butte in 1908 and entered the employ of the Pittsburg and Montana Company as a mining geologist, and am still retained by the East Butte Company after they took the company over; the management continued the same under both ownerships. I was last in the Pittsmont workings to make a careful examination of the Donner vein probably two years and a half ago. I do not remember that I have seen the workings of the Donner vein within two years and a half,—at the same time, that does not preclude the possibility that I have visited the Donner vein since then. I have gone down several times in the mine, not to do any work, but to see what had

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been developed and what was going on. I have gone through the mine several times with Andy Ray, and we have gone to the various parts where the work was done, but I do not remember definitely that within the past two years and a half, that I visited the Donner vein, or that within the past two years and a half we did not. None of the information I have given here to-day is the result of any conversations I had with Mr. Ray. The last two and a half years I have confined to other veins than the Donner, and other than [965] any veins operated in the Pittsmont property. I went to Arizona in the fall of 1909, at the instance of Mr. Oscar Rohn, manager of the East Butte Copper Mining Company, and made an examination of some copper properties in Both Globe and Bisbee; there are very striking similarities in the geological conditions obtaining in the principal productive copper camps of the Western United States; there is usually an acid intrusive rock in these various districts; these acid intrusions are believed to be responsible for the ore deposits in these various districts; the ore deposition has been by hot ascending mineralizing solutions, which have had similar effects upon the wall rock and have resulted in similar deposition of copper-bearing minerals. The secondary enrichment is the same in all of these districts; this acid intrusive rock in Butte is granite; in Clifton, Arizona, it is a porphyry; in Bisbee, Arizona, it is a porphyry; in Globe, it is a granite porphyry; I do not mean that the acid intrusive rock is the vein filling; I think I stated that in these various districts the

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copper mineralization accompanies these intrusive rocks, and it is generally believed that they owe their origin to solutions which have been profoundly affected at least by these acid intrusions. It is further possible that the contents of these mineralizing solutions have been obtained from the acid intrusive rock of which I speak. A vein is a tabular deposit of mineral or mineral-bearing rock in place in the earth's crust, differing materially and separable by definite boundaries from the enclosing rock, and containing such indications of value as will justify a miner in following it, with the reasonable expectation of finding ore. Boundaries may be either physical or determined by chemical means. In this particular camp the mineralizing [966] solutions are presumed to have come from below following relatively small fissures and to have gone out into the rock adjacent to these fissures to various extents. There is no particular way in which these fissures must be formed in order to have a vein. Vein fissures may be formed as a result of volcanic activity, but that is by no means the only way in which they can be formed. If a fissure agrees with the other requisites which I have described in my definition of a vein, it would be a vein; if the fissure contains material that gives evidence of the possession of mineral, so that a miner would be justified in going along with the expectation that he might find a vein, with the further requisite that it is a tabular deposit, it would be a vein, and that may be true in the case of a fault fissure. A slip is a very small fracture which gives evidence of some

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slight movement; the size of a slip or a fault indicates to my mind something as to its extent along strike or dip. Its width, to a certain extent, will suggest its length,—the width and the extensiveness of crushing; if the slip is mineralized and has various other requisites of which I spoke, that would have to pertain to a vein; it would cease being a slip and become a vein. In the case of a vein you always find mineralization,—sufficient mineral indication of value must exist to warrant a miner in following it with a reasonable expectation of finding ore. I have seen various deposits where quartz was iron stained and well worth following, particularly in some gold veins of which I know. You cannot always tell if you find a lead or fissure less than a quarter of an inch wide, whether that would indicate a vein or not,—you must always consider the environment of the matter of the district of which you are speaking. My conception of a slip is a fracture along which some slipping has occurred, [967] some movement as to the relation of the two walls, and in the case of a vein fissure the condition may be the same; vein fissures have been produced by certain earth movements, which could have been occasioned by various agencies; they could have been caused by volcanic action. I believe the vein fissures of this camp owe their origin principally to intrusions and extrusions of various igneous rocks, and there must be fissure there to permit the intrusion. I believe the east and west fissures here that we find mineralized were caused by earth movements owing their origin to the intrusion into this section of

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igneous rock, particularly the late volcanic; in the cooling and solidifying of an igneous rock there are produced certain fractures. I would say that in the cooling and solidifying of igneous rock there is always a production of small discontinuous fractures, known commonly as joint planes. The same cooling and solidification of an immense mass such as this amount of intrusive granite in the Butte camp is, might have resulted, and probably did, in the production of certain fissures of greater extent than these small fissures of which I speak, due primarily to the same causes,—the granite being the igneous rock I refer to, and in this cooling process, this cracking may occur which would account for those east and west fissures on the Butte Hill; in the case of those slips, some of them might have occurred and been formed at substantially the same time and many of them have been formed subsequent to the formation of the ores. There is just one distinction that I perhaps have in my head that you do not get. In the cooling of a large igneous mass, such as this Butte granite is, in the first cooling there is cracking in a small way; well, these various—in the cooling of magma, there is a contraction; well, while [968] in any individual place that may mean simply a few cracks formed here and there, extended over a great distance, that amount of cracking may cause great stresses such as to form east and west cracks as we have now in the Butte Hill. Those slips might be east and west in the Butte Hill, and they might be occasioned by the same causes, and in the case of the

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faults, which are fissures likewise or cracks, I believe most of them occurred at a time subsequent to those east and west fissures that we are speaking about, and they are also due to differential stresses, and if they are sufficiently mineralized to warrant exploitation they are vein fissures. In the case of slip fissures, sometimes you find it a knife blade in width. I think the intense mineralization and what it stands for is the chief difference between the Butte Hill and the eastern section; in the case of the Butte Hill you have granite and aplite, and in the case of the east side you have granite and aplite; the unaltered granite I think is the same in both places, and the aplite is about the same in both instances; in the case of the aplite in the Butte Hill, you have the aplite in the way of an intrusive rock, just the same as you have it on the east side; outside of the Pittsmont and East Butte Companies, I do not remember of seeing aplite on the Butte Hill. My experience has been rather limited; the aplite as I found it over there in the different places that I have spoken about is seemingly an intrusive rock, and seemingly there must have been some fissures there at some time in the granite, and this aplite came along and filled the fissures,—that is how it got in there; there are certainly large irregular masses,—whose origin is not quite as simple as that. For instance, if you have a dyke a foot wide of aplite in granite, why your conception of [969] it is entirely clear and correct. Where you have a large mass intruding in the granite, of intrusive aplite intruding in the

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granite, the conditions may somewhat differ. The aplite may have been enabled to force sections of the granite apart and occupy a large irregular area rather than the simple fractures. While these conditions and effects are much the same, there is that distinction; we have the east and west fissures, and we seemingly get a mineral into that in some way or other. I do not believe there ever was very much unoccupied space between these walls of the fissure. My idea is this: That the mineralizing solutions, rather, came up small-sized fissures and produced the ores rather by the replacement of the wall rock than by coming up a big wide fissure that was open at the time they came in; this mineralizing solution as it came up I believe was largely in an aqueous form; there might have been some vaporous material also; the solutions came up relatively small planes and attacked not only broken material, but also the comparatively solid rock walls of that fissure, with consequent replacement of much of that material by ore bearing material; this vein filling encountered in the veins in Butte is altered granite, originally granite, which is called ore,—that is altered granite mineralized, or it may be altered aplite, or it may be referred to as quartz with a peculiar crystalline texture as Mr. Wilson would call it,—particularly the first two. I noticed altered aplite,—so altered through the action of these mineral agencies that the original texture of the rock disappears; I have noticed that in granite repeatedly; I see no reason why it should not also occur in the aplite. Well, I see the original

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texture has been destroyed, that is true, but the fact that we are still able to know that it was granite [970] originally indicates that its characteristics have not entirely been destroyed. Exhibits 75 and 76 are essentially granite with a partial replacement of feldspar by chrysocolla; I would characterize that little piece as a deposition of chrysocolla evidently along some fracture plane; that chrysocolla has been deposited from surface waters, through the reaction of the feldspars from the solutions carrying copper in solution; I have a hunch there is a little copper sulphate in Exhibit 76; copper sulphate and chrysocolla have very much the same color; I believe that there is considerable copper sulphate in that material; there may be some chrysocolla too, but I think there is quite a little copper sulphate. In the case of fissure mineralization, in order to have a vein so-called, it is not absolutely necessary that the mineral must come from the bottom; there is very usually a secondary enrichment by descending waters; where you get the secondary mineralization, for instance in the case of copper, the mineralization to get into the water that takes the mineralization downward you get usually in the productive copper deposits of the west, there has been an original mineralization by solutions bearing and depositing quartz, iron pyrites and certain copper minerals. Subsequent to this original mineralization, the ground mineralized has been subjected to the action of downward moving waters, these surface waters presumably of meteoric origin; these waters take into solu-

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tion the copper or the iron,—a certain portion of the iron, and usually redeposit the copper upon some of the minerals of primary deposition. The great copper glance deposits which are productive of a great portion of the copper have been formed chiefly in this manner; that is the secondary enrichment which is due to descending waters, and takes up this copper [971] that may be found in the upper strata,—deposited there from ascending, mineralizing solutions; that is the first instance, you understand; in the first instance we have the copper coming from beneath and then later on we have it taken up as it comes to the surface, or rather as it is deposited in the upper regions, taken up by descending waters and carried down again; I might further state there is oftentimes a somewhat wide dissemination of mineral bearing minute amounts of copper, which may not owe their origin to this same source, but may possibly have crystallized out with the original magma. I am not absolutely sure whether there is mineral in this magma, which is the prototype of the rock; there is considerable discussion for and against. In certain instances, I know that mineral comes out with the original rock, magma, and then, through the chemical changes occurring in the rock itself, for instance subjected to atmospheric action, and the action of the water, there may be a release of the copper in the original rock, which might account in a measure for some of this mineral that is carried down by the descending water; but as to commercial copper deposits, it is very rarely that they are not found owing

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the chief portion of their copper content to the primary mineralization, which I have described, as coming subsequent to the rock formation. The depth to which this secondary mineralization extends depends on the opportunities for oxidized surface waters to descend into the earth. In the instance of the porphyry deposits of Ely, Nevada, for instance, or Bingham Canyon, the secondary enrichments do not reach a considerable depth,—perhaps five or six hundred feet from surface would cover most of the commercial ore that has been produced by this secondary enrichment. In the Butte camp, certain fissures [972] go to a very great depth and allow a considerably greater downward vertical movement of these copper bearing solutions, so that here you would find secondary chalcocite at greater depth than at Ely, Nevada. I do not think this mineralization through ascending waters and vapors is going on in those leads here to-day; I believe the mineralization from descending waters is going on to-day; in case of the secondary enrichment, or the enrichment from descending waters, wherever there is an opening in the earth and these waters have access to that opening, they readily use that as a channel, and that is equally true as to fault fissures, vein fissures and slips; the ordinary slip or joint plane, as we know it, has not the continuity that the faults and vein fissures have; one other thing in the deposition,—in this secondary deposition,—there must be some precipitating agent. For instance, if you had a mineralizing solution, going down through a clay fault, it might

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not deposit any chalcocite, whereas if you had this same solution going down through a pyrite vein, it would deposit on the pyrite. In the case of a slip that occurs in a granite body, you are likely to have granite there in a broken condition; in the case of a vein you have additional material,—you have sulphides and iron pyrites; in the vein fissure you have great abundance of iron pyrite. In the granite mass itself I would venture to say you find large areas without the pyrites, and I am not entirely certain as to how widespread and general the iron pyrites in original igneous rock is; so far as the original fissure is concerned you may have a fissure which is later filled by vein material, which at some time in its history did not contain vein material; until that material has been replaced and altered and mineralized in the case of the vein fissure; in the original [973] mineralization, there is usually an addition of iron to the altered granite rock; when the copper gets in there, there is also an additional supply of iron pyrites; where the descending water gets into the fissure, there is the absence of that iron pyrite to take it up, except in possibly very minute quantities, as I have suggested may have formed along with the original rock formation. It is a matter of your own personal opinion in telling a slip from a fault fissure; it is quite comprehensible that I mark a slip something that a geologist with the same training and education and general experience might designate as a fault. Those slips I spoke of yesterday, I referred to them as fissures without any evidence of mineral-

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ization in many instances,—they are breaks in the rock, without any evidence of vein mineralization at all. There are many others that I spoke of as not giving evidence of this original vein mineralization of which I spoke, but in which there might have collected some chrysocolla and iron oxide, similar to that found in the surficially altered rock adjacent.

There is a very well defined fault in shaft No. 21, and there is a fault fissure in shaft No. 19; the material in the fault fissure in shaft No. 21 is usually clay; there are some rounded fragments of quartz and very silicious granite that still remain in the clay. One of the very typical characteristics of faults in this camp are these hard portions of the rock that have been more or less ground up remain in the clay fault,—remaining in the clay fault. There are oftentimes faults following along a vein fissure with the production of clay; outside of the origin or the plane of the fault fissure, in the primary mineralization of that vein you do not find clay such as you find here, unless that mineralization has taken place [974] subsequent to faulting along that plane, when clay might have been produced. Quartz might be produced from the breaking down and disintegration near the surface of vein material, but in the primary mineralization there has been some faulting and movement beforehand. You would not expect to find that occurrence. The clay is an alteration product of the granite; clay as the altered product of the granite,—take the feldspar. Due to the fine grinding of feldspar materials, it is subjected to the chem-

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ical action that surface waters have upon it, and this feldspar is chemically changed from a feldspar to clay, an entirely different material. It has many,—most of the mineral constituents as the feldspar, but occurring in a different form. I can conceive of veins formed without the rubbing process, and where the rubbing process does exist; there are two very distinct alterations by waters; one is the alteration of the granite by ascending solutions, containing water and at a high temperature and pressure. They produce certain results upon the granite. There is on the other hand, the action of ordinary meteoric waters, descending through the granite. They produce altogether different alterations. Those alterations are known as alterations due to weathering. This clay is a result of some feldspar movement, and then afterwards the action of surface descending and meteoric waters. I am not always able to tell from the inspection of the material whether the mineralization is from the bottom; the mineralization from the bottom may oftentimes have superimposed upon it an alteration due to surface descending waters, and so obscure the character of the primary mineralization. There are a sufficient number of clay seams of tabular extent to determine the attitude of that fault in the bottom of shaft No. 21, and the strike of them is practically [975] north and south,—I mean it is within a very few degrees of north and south; there is not any east and west; there may be openings east and west, but on a full consideration of all conditions showing in that shaft, can leave no

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chance for a conclusion other than that this is a north and south striking fault; there are no lines in the structure that are easterly and westerly; there may very possibly be breaking in all directions. When we are studying the ground under consideration, there are very many minor conditions that you do not study and note with the same care as we do those conditions that have a bearing on the subject under study. Toward the southeastern corner of the shaft, the granite is not as much altered as it is in the remainder of the shaft. I would not be certain that that did not represent the hanging-wall portion of that fault, nor would I be certain that the fault would not extend beyond that fault; the dip of that fault was to the east. Defendants' Exhibit 96 is very similar to the kind of material I saw there; I presume most of that material has been obtained from granite, and it has suffered considerable alteration; you quite often find material like that in veins, in the upper portions of veins that have been leached and altered by surface weathering and waters; I would judge that this was bounded by country rock; the iron is the only metallic mineralization that I note in that piece; that material is particularly noted in the western portion of the shaft. As you approach the eastern portion of the shaft the granite has not been subjected to as much alteration as this material here shown; in tunnel No. 30, which is the opening east of shaft No. 21, I found aplite with various well defined joint cracks and walls, denoting neither veins nor faults; I remember there was one along the eastern side of the tunnel,

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[976] near the face, striking about the tunnel, I believe. The material in the cross-cut to the south is very typical aplite, unaltered, except possibly by some surficial alteration, caused by descending waters; which might carry mineral, but the alteration which I saw was not due to the mineral content of descending waters; it was principally, as I remember it, some kaolinization of feldspar, production of clay from the feldspar. I call Defendants' Exhibit 97 aplite; I saw material of that kind there; the country rock there is aplite. When I speak of breaks or planes I have reference to fissures; I think in this instance most of the planes I speak of are joint cracks; there may have been one or two produced by differential strains acting upon that particular portion of the aplite; I have already referred to one break which followed the course of the tunnel near its face, and now that you speak of the south cross-cut, I remember, further, a rather distinct plane crossing the south cross-cut, northeasterly and southwesterly, I would judge; also I noticed a rather distinct north and south plane on the west side of the cross-cut, north; that same material can be found anywhere throughout that aplite, by a little careful consideration; a vein fissure might form right through that point; it might contain a horse of this same material; there is a great deal of quartz in this, and you find quartz in veins; I do not think there is any vein matter in that working or in that material that you now show me; it is comprehensible that material of that sort may be included in a vein; it would be there originally; it

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might be included within the boundaries of a vein; I would call that a horse; quartz may be included within the boundary of a vein without being a horse; quartz is usually in veins and part of the mineralization, and this is quartz.

[977] It is a portion of the original aplite; the micas have been somewhat altered, I would say, giving this iron stain. The feldspars have probably been slightly kaolinized. Such alterations as are common in rock outcrops at the surface, entirely away and distinct from veins; such condition might also exist in the case of material of this kind found within the walls of a fissure. Shaft No. 1 was in the country rock, slightly altered by surface actions; there are some very well defined ribs in the altered granite, having various strikes and dips of somewhat more silicious material than the ordinary granite; I saw these silicious ribs in many of other openings on the ground,—in the shaft noted as No. 9, or No. 3, in the No. 2 shaft, in 31 tunnel. I remember those points distinctly; I cannot refer, or remember at the present moment the distinct noticing of these ribs in other workings, but I presume that they could be found in most all of the workings in this ground. The width of the largest silicious rib in shaft No. 1 I would presume to be under ten inches; I think all those ribs you could find pretty definite bounds for them; the material bounding the rib was granite, but the rib itself was more silicious granite; the rib itself contained feldspar and mica, and a greater amount of quartz than is ordinarily found in the granite away

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from there. Exhibit 77 is granitic material quite silicious, that has been considerably iron stained, perhaps somewhat further altered by surface weathering; you might find that in a vein, having no relation whatsoever to the formation of the vein; there is quartz in there; the only metallic mineral that I note is iron stain, which suggests that there has been some alteration and iron staining of the material that is essentially granitic. It does not suggest the possibility that as you go [978] deeper in the fissure, you may find more mineralized material. You find quartz in a vein fissure without being mineralized; it usually has certain accompaniments which, interpreted in the light of observations in this particular section, or in this particular district where you find it, will give you some basis to judge it; it has the same alteration that is noteworthy in granite country rock commonly. There is here a greater amount of silica or quartz than is found in the ordinary granite. There is here a greater amount of iron oxide, but that does not indicate to me that there will be a heavier mineralization at greater depth, but you may find granite in a vein, but if I found that granite in a vein without being mineralized, will that lead me to believe that there is greater mineralization at greater depth? I do not infer that there would be greater mineralization at greater depth from what I see here. I have examined at the surface particularly various leads on the Ballaklava ground, also certain leads on the Tuolumne ground, certain surface leads on properties adjacent to the properties of which I spoke;

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many of those leads which I recognized as leads which might have copper in them below, had no copper whatsoever at the surface; there was mineralization at the surface, but not copper mineralization; an examination of the texture and appearance of the surface cropping of a vein which at greater depth goes into copper, usually shows a chalky material which has been developed through the alteration of the granite, and further usually shows a heavy amount of iron oxide. These materials notably differ from the adjacent wall rock; you have the iron oxide here,—the only thing that is absent here is the chalky substance; it would be pretty difficult to interpret into words my judgment of surface showings so [979] that it would be absolutely clear and comprehensible. With this material here we have iron oxide; the presence of iron oxide in that material did not indicate to me that there was greater mineralization in depth; I encountered iron oxide in the veins I examined in the Butte and Ballaklava, and there was in addition to the iron oxide, so as to suggest copper mineralization at a greater depth, this chalky substance that I told you about. It does not invariably follow in the light of my experience that where you have iron oxide without any copper mineralization, in order to have copper mineralization at a greater depth, this chalky material must exist; I will qualify that by stating that this occurrence that I speak of is the usual occurrence in the Butte camp; it is possible that when you have silicious material in a vein fissure with iron oxide and without this chalky arrangement,

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that fissure at depth may present copper mineralization. In shaft 21 there is iron oxide and the clay material, which would suggest to me that there was a fault in shaft 21, but you can find copper in a fault; in the case of the Butte and Ballaklava you have silicious material and you have quartz, oxide of iron, with this chalky arrangement, suggesting to me copper mineralization at a greater depth; and in the case of shaft 21 we have the oxide and this chalky arrangement and quartz suggestive of no copper mineralization at a greater depth; there are very many other characteristics in shaft No. 21 that denote the character of the fault which crosses that shaft. In the mineralization that you note accompanying and produced by the primary mineralization which has been the source of the highly productive veins of the camp, there is an alteration of the adjacent country rock, and which I touched upon slightly in my direct evidence. The country [980] rock which is originally a fresh granite containing mica, hornblende feldspar and quartz, has been altered to a rock containing sericite and iron pyrite. When this material is subjected to the action of surface weathering agencies, the pyrite is characteristically altered to iron oxide. The sericite retains much of its original character and is partly altered to the clay material. The quartz remains very much the same. Having observed the alterations at depth and the surface croppings of those veins whose deeper workings I have seen, I can observe usually certain distinct characteristics in the surface croppings by which I infer

(Testimony of Julius H. Warner.)

that at greater depth copper mineralization may be found; this chalky substance is ordinarily composed of a certain amount sericite and a certain amount of clay. This sericite is not ordinarily found in the resulting alterations of granite rock, produced simply by the action of weathering solutions, and that has to do with the chalky substance; in certain chalky substances I can note a certain amount of sericite and some clay. For instance, in this chalky substance you have in the No. 21, it is essentially clay. The definite characteristic of the surface croppings I refer to, is simply the existence of, or nonexistence of, sericite and this clay, and further, in the surface croppings of a copper vein, the amount of iron oxide is usually in very much greater extent than in these faults and slips. And further, you can oftentimes note how that iron oxide has oxidized in place from pyrite to the iron oxide. I noted no sericite in shaft No. 21; sericite would not absolutely have to be there if it were a vein, or if there was to be any copper mineralization at depth. I am trying to bring out to you the accompanying characteristics of veins and faults in this camp. It is not impossible that certain [981] characteristics of one may not appear in another, in that many of the characteristics of faults occur in veins and *vice versa*. I would expect to find those characteristics of which I spoke in any copper veins in this camp; my experience is limited, and I will not say that it is necessary that all the characteristics must be there. In the case of shaft No. 2, we have very much the same conditions as encoun-

(Testimony of Julius H. Warner.)

tered in shaft No. 1,—there is some of this highly silicious material there, and there is some aplite in that; I do not think I noticed any aplite in No. 1; I believe these silicious occurrences occur in ribs. Exhibit 98 is strictly aplite, mostly unaltered; there is considerable iron staining there, very silicious indeed; a large portion of the aplite in that section subjected to surface alterations, has the same characteristics as the piece which you now hand me. I would call it a piece of aplite, rather than a piece of quartz; I think there is a considerable amount of pure quartz, and plentiful; a very large proportion; presumably upward of seventy-five per cent of that would be quartz; there has presumably been some mica in this aplite; this has been removed with the exception of the iron that it contained; it has gone to iron oxide. There is no reason why a horse of that material should not be found within the boundaries of a vein; if it existed in a vein, it would be in the nature of a horse. This white stuff is very largely quartz; I think there is probably a small amount of feldspar therein contained; when the aplite originally crystallized, some portions of it crystallized almost entirely as quartz. This quartz here, in the shape in which it is, came into existence at the time this aplite became congealed, or became solidified instead of congealed. I think I stated in some previous testimony that I believed the silicious [982] portions of the granite in this shaft were in ribbed shape, therefore having certain boundaries and existing that way along certain lines. There is no question, I think, in

(Testimony of Julius H. Warner.)

my mind but that there are two occurrences in shaft 31 that would warrant, or tunnel 31,—that would warrant the miner in following them in the hope of finding ore. I call them veins in that sense; they do not show to me those typical characteristics which we usually find accompanying the real veins of this camp. There is a fracture zone ten to fifteen inches in width that follows essentially along the aplite dyke. As to the cause of this fissure, I would not say other than that it has resulted from differential strains in the earth's crust. Cracking planes in the granite may be fault planes, may be vein fissures, may be faults. I spoke about fractures, well-defined slips in the Vesuvius workings; differential strains may occasion those planes in the granite; there are fractures; differential strains may cause fissures known as such. My idea about the matter is that in this instance the fissure encountered in the cross-cut in tunnel 31 is due to differential strains,—that is to say, if you have a strain pulling down on this table strong enough, it is going to break that table; you have two strains acting there, one tending to keep the table as it is and one tending to break. They are differential strains; volcanic action sets up those differential strains, and so does cooling; differential strains is a kind of a general term that may cover a multitude of activities that might result in a fissure, but I cannot tell you whether this fissure was caused by volcanic action or by a cooling of the granite, and I cannot tell what its depth is, or its length; all the mineralization that you find in that vein can well

(Testimony of Julius H. Warner.)

have been deposited by the downward action of surface [983] waters, carrying some copper in solutions, and depositing it in this fracture, as it has deposited it in many other fractures and seams in this section. The typical alterations that occur accompanying ascending solutions are not present adjacent to this showing. I have already spoken before,—chiefly a development of sericite in addition to pyrite; the quartz probably remains the same. I would call those two separate veins from the standpoint of a miner. The dip of the most southerly one was seventy-six degrees to the north, and the dip of the northerly one was eighty degrees to the north. If these dips were regularly maintained in their downward course, you would have to go in the neighborhood of one hundred and forty feet below the place where they are cut in the cross-cut before those two veins came together. It is no uncommon thing to find leads such as these are converging at depth. The mineralization encountered in the cross-cut there, and in the tunnel east of the cross-cut, is mineralization due to descending waters, and there is nothing to indicate that the mineralization originally came from below; a certain type alteration of the granite is not visible there that is commonly associated with the veins; we are simply up there in the oxidized zone; you can usually determine when the granite has been subjected to the alteration by deep seated waters,—deep seated mineralizing solutions, and afterwards subjected to weathering agencies; in this case, of course, we have in this cross-cut not very

(Testimony of Julius H. Warner.)

wide fissures; I would judge that there were several parallel fractures making up each of those fracture zones; I think several parallel fractures are indicated there, and now that we have them altogether, there is a fracture or a fissure there of ten or fifteen inches in width, and the filling of that fissure is essentially quartz and [984] chrysocolla. You can notice a grading directly into aplite material, and I think most of the quartz therein contained is part of the original aplite that existed there; I saw no evidence that would indicate to me that it had been mineralized by ascending solutions under high temperature and pressure; my judgment is that in that fissure there were no ascending solutions. There is likewise some cuprite visible; I have noticed in the case of chrysocolla that it is found outside of the main fractures; I do not remember exactly with regard to the cuprite; there is a rather distinct difference in the amount of fracturing and deposition of the chrysocolla and iron oxide between this ten and fifteen inches, of which I spoke, and the hanging and foot-wall, if you please, on each side; from the tunnel,—these distances of mine were usually not taped, but they will not alter but slightly from correct. The first one of importance that I described, is approximately twenty feet from the tunnel, and then there is a distance between the two leads of about ten feet, and the second lead has a width of one foot to eighteen inches, and then beyond the hanging-wall of that second lead, the face is about two feet distant from the cross-cut. Between those two leads the granite is

(Testimony of Julius H. Warner.)

rather fresh, typical material, thin, somewhat altered by surface weathering,—and I believe there is some chrysocolla evidenced between those two leads; the altering is due to the access of mineralizing fluids in that surface water, coming through that section, having carried some copper salts in solution and have deposited them in this fresh granite; I don't know how richly mineralized that fresh granite is, and I don't know how deep the mineralization extends, such as it is there; it would appear that the first streak met in the cross-cut is one and the same [985] as the streak encountered in the tunnel about thirty feet east, northeast of the cross-cut in question. The lead is not visible all the way on its strike east, but on reaching this occurrence which I spoke of in the tunnel, there is again found a very well defined aplite dyke, carrying considerable chrysocolla, extending much the same as was the first important lead noted in the cross-cut; this fracture is in aplite; in the twelve inches you encounter chiefly chrysocolla and quartz in various portions of this ten inches,—the quartz is clearly noted as having made up the aplite which existed there when these fractures were made; presumably much of this aplite is chiefly quartz, also some of the feldspar that existed in the aplite has been removed and its place taken by chrysocolla; I believe the footwall of this first streak is still in aplitic material, and it is as well mineralized as the substances in the fissure itself; aplite is not hostile to this chrysocolla that I have noted in this so-called fracture zone; there are several parallel fractures

(Testimony of Julius H. Warner.)

that may be ten or twelve inches wide, but there are several fractures going down your solutions come here and attack material immediately adjacent and it is not at all surprising that the footwall, away from those fractures, is not mineralized,—has not received chrysocolla; my conception of the footwall is a little beyond the fracture, and as a matter of fact, this descending mineral water can get as close to the footwall as it can get, to those dividing walls in those several fractures making the fracture in its entirety now; but while this ore-bearing solution can deposit chrysocolla between these narrowly spaced fractures, and through them these fractures may not be over two inches apart, coming to the footwall you readily see that country has not the same opportunity for the deposition of [986] chrysocolla; the two leads I encountered in the cross-cut have a slightly divergent strike, I believe; I think the northerly one is striking east and west, and the southerly one north seventy-seven east,—the northerly one due east and west. The material in exhibit 82 is principally quartz and chrysocolla; portions of this quartz are clearly the same quartz as is found in various aplite dykes that cut that section, and I would judge, from my examination of this piece, that that quartz had such an origin; that has been referred to as typical vein quartz; in this district I would not so characterize it. You can discern no apparent crystallization there; from the glassy appearance of this quartz I would judge that under a microscope it would show crystallization; I think there is a certain interlocking of the

(Testimony of Julius H. Warner.)

crystals; usually, when a solution or magma containing principally silica, crystallizes, the quartz crystals interlock, and that is true in the case of silica of the aplite and in the case of the silica of the granite, and this sample I have just inspected is such quartz as you find in the veins in Butte, and its mineralization is such, with the accompanying conditions, that you would say that the mineralization came from the surface through descending waters; it is very similar to exhibit 99; I believe it could have been taken from the same occurrence; I would not call that vein quartz; a large portion of that material is quartz; it is composed of the same material; in this aplite there is commonly a somewhat sugary texture. In certain portions of this quartz, which from its environment and associations, I have no doubt that owes its origin to the same sources as does the aplite; as I say, there are certain portions in which I would not definitely state that a man can determine from observation whether that quartz has been deposited [987] as a vein or as a part of the original aplite; I believe all of this quartz in sight has been deposited as a part of the original aplite; the quartz did not come into the aplite through the alteration of the aplite at all,—simply came in originally when the aplite solidified. I would not state on the basis of a piece of quartz entered here, away from its environment, in all cases whether that quartz be produced from vein origin or whether it be a piece of rock produced from a magma; but I will bring a piece of vein quartz; taken from the oxidized zone,—that is, the true vein quartz.

(Testimony of Julius H. Warner.)

I was not able to find the northerly or hanging-wall of the cross-cut I encountered in the tunnel, where it enters the tunnel; the south, or footwall, is fairly evident, and at that point I encountered a fault, and this vein, or circumstance, disappears. I did not find the vein again at any point in the tunnel towards its face; all of the country rock in those cuts is not mineralized and stained as I found the country rock in the cross-cut outside of the fissure zone; you find that discoloration particularly in 31, more apparent east of the first fault encountered in the tunnel. It is also found widely distributed in the Vesuvius workings. It is also found to a considerable extent in the Mullins workings and the Hornet shaft. I remember going into a cross-cut to the south; you are in the country rock southeast there; there is no fault zone in that immediate neighborhood; the country rock there is chiefly granite,—there is also some aplite in that cross-cut; the coloring, if any, is not as noticeable as adjacent to these fracture zones of which I have spoken; I encountered two quite well-defined faults in that tunnel, well defined northerly and southerly striking faults; there is another light slip that is noted just as you reach the [988] occurrence of this mineralization in the tunnel, some thirty feet east of the second cross-cut, or the main cross-cut; this comes along part way up in the tunnel, and I am not clear as to whether it has offset this fracture zone, or not.

I was in the Rabbit discovery shaft on either the twentieth or twenty-first of December; I have also

(Testimony of Julius H. Warner.)

visited it since; there was some discolored material one or two inches wide, principally aplite and chrysocolla in a cross-cut; the west of the Rabbit discovery, in the bottom; in the bottom of the shaft I encountered granite country rock, only altered by surface weathering. I saw material there very similar to Defendants' Exhibit 23, and this material would be within two feet of the bottom, about twelve feet from the surface,—I saw this material in the cross-cut to the west; that shaft is not timbered. I would not call it ore in that occurrence. I believe that is with sufficient, with a high amount of copper, so that if it existed in sufficiently large quantities, it could be mined commercially, and could be called ore; there are one or two inches as it appears there in the cross-cut; I only noticed it in the extreme western end of the cross-cut; I would judge from the way it leaves the cross-cut, that it has an easterly and westerly strike, dipping about vertically. If it prosecuted its course easterly, I would expect it would go through the shaft. In the case of shaft No. 9, there was a slip there of two to four inches,—a slip is some kind of a fracture or fissure; that contains some chrysocolla and iron oxide, but the amount of chrysocolla in that showing would not be ore, because it could not be commercially operated there; it is there in a fissure, in a kind of a slip, but not in quantities sufficient to pay to operate. That dipped seventy-five [989] degrees to the southwest, and the strike was seventy-nine degrees west; it was on the easterly side of the first cross-cut north, four feet from the shaft

(Testimony of Julius H. Warner.)

timbers where I saw it; on the west side of the cross-cut there is another slip, in the same cross-cut, with a strike east and west and a dip eighty-two degrees north; I was not able to establish any connection between the two fractures; they were three or four feet apart,—one was dipping north and the other south, and they contained quite similar material. I could not, as to the extent of the fissure, tell how far they extended into the earth, but as to the extent of the iron oxide and chrysocolla I could, which evidence I obtained in a cave to the north of the shaft, directly below that cross-cut the back of this cave being not more than six feet below the sill of the cross-cut above referred to; neither of those slips go into the shaft in their course; the easterly one would closely approach the bottom, or the southerly one of the two would closely approach the bottom of the shaft; if this shaft extends to a depth of forty feet, as I believe it does; it would reach it on its dip, but not on its strike at the elevation of which we are speaking,—the cross-cut elevation; there is also to be considered that the dip may change and it might reach the shaft, or it might diverge from it; the shaft is timbered. I would not be certain at what depth it reaches bedrock; the bottom of that shaft carries considerable muck; with regard to the slip of which I spoke, assuming that it projected on the basis of the seventy-five degree dip, I find that in the back of this cave this slip had a much deeper dip,—was approximately ninety degrees; it would, therefore, appear that it is unlikely that this slip would reach

(Testimony of Julius H. Warner.)

the shaft at a depth of forty feet below the surface; there are several slips [990] visible in that locality, from observations made by me in the cave principally; the slips that you have reference to, I believe, are the slips noted in the cave; the material in those slips was not mineralized; there might have been some iron oxide in some of these slips. I believe those timbers are five feet, and in the fourth set from the top, to the east of the shaft the granite was disclosed, and at a distance of twenty feet from the surface you are in bedrock; the bedrock comes at least four feet higher. The bedrock is in at least sixteen feet of the surface. I am inclined to think that it is somewhat higher, but am not positive on that point. There is no fissure in the Vesuvius workings with type vein filling, or with vein filling other than could have been brought into it by the action of surface water. In the case of locating a claim, there are simply surface indications generally, and that there is simply a discovery in a shaft or in a cut; it is not my idea that the material disclosed there must be sufficiently mineralized that the expense incurred in exploitation will be met by the value of the mineral; in order to make a location I would think there should be indications of value such as to warrant development work, with the hope of finding ore. I have never been called upon to figure whether the mineral solutions went down or came up, but in occurrences such as are shown in this eastern section, I would take those things into consideration. I do not think any fissure in the Vesuvius indicates that one would

(Testimony of Julius H. Warner.)

be justified in exploiting it with the hope of finding ore; it is largely a matter of who locates it. I found fissure filling there, and I found chrysocolla and iron oxide in the fissure to which you probably refer, in the southerly portion of this working, and I think a prospector would be very well justified [991] in making a location on the ground, but I do not think I would from these appearances,—there would probably be a difference in the judgment of a prospector and a geologist; I am testifying as to how these various occurrences appear to me as a mining geologist.

Colonel Nolan, as we were closing last evening we were speaking of whether or not a prospector would be justified in locating a claim developed in the underground workings of the Vesuvius. I stated, and I think you understood me, that a prospector would be justified. The idea that I had in mind, and that I think you understood, was that a prospector would feel justified, not that a prospector would be justified in my judgment. I make a distinction between “would be” and “would feel.” If I would say he would be justified, it would depend on my judgment; if I would say he would feel justified, it would depend on his judgment; I would apply tests in connection with the appearance of things that the ordinary prospector would not be expected to apply. I do not think there was any ore taken from any work done in the Vesuvius workings; I do not think that any one could go ahead on the showing there and produce or commercially; it might be possible to take out five or six tons of ore along the entire extent of

(Testimony of Julius H. Warner.)

the working,—to have gathered together four or five tons of material that could be shipped and smelted at a profit, but I do not believe the work on any of those mineralized fractures of which I speak could have been paid for by the ore taken out, having in mind all of the excavation work done on any fracture from which the ore was taken out; I would not include in that the long cross-cut or the shaft sinking; in mining operations, if you cannot conduct your operations at a profit, you are not warranted in such [992] mining, and the material that you take out cannot be considered as ore. It is a fact that in some of the biggest mines in this camp, operations were conducted in the operating of the property that have run behind two or three hundred thousand dollars before they begun to get pay ore, but at the same time, under such developments that they had a hope of getting better ore with depth; and likewise where the operations were carried on at a loss up to a certain point, and the indications are such that they are further carried on with the expectation of retrieving that loss and making money, disappointment is experienced, and they very often never get to that point where they realize their expectations; that is very common in mining. I will not say that the southerly one in the Vesuvius is a mere joint crack. I would think it was somewhat more extensive, but I do think that the mineralization which you now see will disappear with depth; I would not say that the fracture might not decrease or that it might not in-

(Testimony of Julius H. Warner.)

crease with depth, and the same facts apply to the strike as the dip.

This piece of vein quartz I obtained from the fourteenth floor, above the eight hundred level on the Motheral vein, in the Pittsmont mine, in the oxidized zone; this is typical of the vein material. (Witness produces sample.) The vein is about eight feet in width where I obtained this sample, and that material constitutes the major portion of the filling; it is very largely quartz; there is also some iron oxide; there is one other further occurrence that you might not notice offhand, but which is very clearly noted in many of the pieces of quartz which you pick up, that is there is a very fine dissemination of iron pyrite through that quartz; if such a texture of iron pyrite can be shown me that came from these workings, I will [993] reconsider my judgment; in order to have a vein you must have some further mineralization than quartz. You see the quartz in these veins has contained a considerable amount of pyrite and other metallic material. As this is weathered out, it leaves the iron oxide pits in its place. In some places where the quartz is very close textured and oxidizing solutions have no ready opportunity to reach it, a breaking open of that quartz will show these typical sulphides as yet unaltered; there is an indication to me that there has been a mineralization from the bottom up; if you have sufficient mineralization from surface waters, you may have a vein, but in the Butte camp that is not the customary occurrence. It is not necessary to have mineraliza-

(Testimony of Julius H. Warner.)

tion from the bottom to have a vein, unless where there is mineralization from the bottom, I would not look for extensive copper depositions, but that does not preclude the possibility that there may be sufficient copper deposition in faults or fissures, simply from surface solutions, to entitle such fissures to the name of a vein; that pyrite is often found in deposits which do not contain copper, but it is a typical accompaniment of the copper ores in the Butte camp; I refer to the Motheral vein; in my experience, I do not think I have ever seen pyrite clearly deposited from descending waters, but I have read certain reports of occurrences where it was thought that a close relative of pyrite, marcasite, was deposited from surface waters. I never observed iron pyrite deposited from descending waters, but I believe that certain work done has shown a certain close relative of iron pyrite called marcasite,—that this material was sometimes deposited from descending surface waters. I do not think, however, that any of the pyrite from the Butte camp has been deposited by descending waters. [994] I think the only difference between the iron pyrite in the sample submitted and marcasite, which it closely resembles, is difference in crystal form; both of them contain iron and sulphur; there is possibly a difference in the proportions of these components; I am not entirely clear on that, but it can be readily looked up; it is my belief that this is iron pyrite because iron pyrite is the chief mineral containing iron and sulphur, found in this camp. I have never known of marcasite being found

(Testimony of Julius H. Warner.)

in this camp; I am not prepared to say that it cannot be found; I cannot tell whether it is pyrite or marcasite, except from all the experience and knowledge I have of this camp and reading of various authorities on this camp; I have not heard of marcasite being mentioned, nor have I seen it. I am not absolutely sure whether Kemp holds that iron pyrite can only be caused by ascending solutions. I believe that Mr. Weed in his report upon this district, will state the iron sulphide mineral, pyrite, in this camp, has been produced by ascending solutions, and there is a further report in one of the bulletins of the United States Geological Survey. The bedrock was not reached where I obtained this sample; it was in the oxidized ore above the sulphides in the Motheral vein, in the bedrock, but I do not know to what extent above that the bedrock extends; I obtained the sample probably two sets above the sulphide zone. There is a very sharp distinction between the sulphide zone and the oxidized zone in the Motheral vein, and as regards to that pyrite, I might say that I have often seen fresh pyrite at the surface of a quartz vein, where the quartz was closely textured and oxidizing solutions have not had an opportunity to readily reach such pyrite; there will be found very small change in the material there shown between that [995] point and the wash. Going down, perhaps two sets below, you will find a very marked and distinct change as you go into the sulphides. It has not been my observation in this camp that there is any marked changing of the mate-

(Testimony of Julius H. Warner.)

rial in the vein filling as you increase in depth from the surface, and especially as you approach the sulphide zone; it has been my observation that there is a marked change as you go from the oxidized zone to the sulphide zone, but it is remarkable in how short a time and space that takes place.

By General NOLAN.—We will offer this sample in evidence as a portion of the cross-examination of this witness.

By the EXAMINER.—I will mark that sample Defendants' Exhibit No. 112. There are some points of similarity between Defendants' Exhibit No. 109 and the sample I brought in here this morning; both the samples that you now show to me and the sample that I have brought in contain quartz and iron oxide. As regards the sample which you now hand me, there is evidence of fresh only weathered, feldspar and mica; I would never expect to find that occurrence from the point where I took this sample; I see no evidence of any iron pyrite in this sample No. 109; the iron pyrite is believed to be brought in with the vein quartz and other sulphides and deposited contemporaneously with the vein filling in the veins of Butte. The constituent elements of iron pyrite are iron and sulphur,—there are other combinations that iron makes with sulphur; iron and sulphur and arsenic make up iron, and copper and sulphur and iron make up chalcoppyrite; copper, sulphur and arsenic make up enargite, another type mineral. The constituent elements of iron pyrite are iron and sulphur; you cannot find the mineral pyrite com-

(Testimony of Julius H. Warner.)

bined and deposited in descending waters; both iron and sulphur may [996] be in descending waters, but they do not unite from descending waters to form this mineral usually, in the Butte camp; in the study of geology and these various origins of ores, one can only study the effects, study in a laboratory what reactions may be brought about. It is an observed fact that descending waters, carrying iron and sulphur, do not deposit iron and sulphur as pyrite. In the original deposition of these ores, the conditions were different from the conditions under which surface waters are now descending. There was high temperature, there was high pressure. Presumably these sulphides were carried in alkaline solutions and deposited from them. On the other hand in descending waters, we have acid solutions, we have normal conditions of temperature and pressure. The iron is largely oxidized and remains on the surface as iron oxide. The sulphur unites to a considerable extent with copper. That copper is copper sulphate, and in going downward in the sulphide zone,—when the sulphide zone is reached, this sulphur and this copper are deposited as copper glance. At the time this material suffered the change it became oxidized; I would not expect that the solutions which brought that about were under any but normal conditions of pressure; this oxidation occurs within a reasonable distance of surface,—perhaps a few hundred feet; I do not believe that the pressure at the greatest depth is materially different than the pressure on such moving bodies at the surface. It

(Testimony of Julius H. Warner.)

may be somewhat greater; I would expect it to be somewhat greater; I do not think the temperature is any different where that suffered change, than the normal surface temperature, materially different. I did not see any marcasite in sample 109; I think it is simply iron oxide and altered granite; you have quartz both in sample 109 and sample 112. I have iron [997] oxide in my sample, and it is also in this. In sample 109 I find comparatively fresh mica, a constituent of granite. I think at some stage in its history this material from 112 contained some granite, which has been so altered that at the present time it is in no way observable; those are the chief differences between those samples. In a vein that is exposed in the Mullins tunnel, we have vein typical of the veins in the Butte camp; in my judgment the origin of that vein was the mineralization of the contents of that vein from ascending waters and vapors. I found no iron pyrite. We have veins mineralized by ascending waters and vapors, without the iron pyrite, in the oxidized zone,—all the instances that I noticed are in the oxidized zone; the absence of iron pyrite does not necessarily establish the fact that the mineralization may not be due to ascending waters and vapors, but in my judging of the character of any of these veins, we do not judge on any one individual point. There are very many points that we take into consideration; oftentimes one point will be common in various occurrences; I can take you over here adjacent to this ground and show you acres of ground that contain quartz and

(Testimony of Julius H. Warner.)

iron oxide, but no vein whatsoever; I have reference to the outcropping rock to the west of the road going up Woodville Canyon; the aplite there is very similar to the aplite disclosed in the underground workings in the ground in question, but there it outcrops on the surface and you can see more of it than in the ground in question; wherever that material outcrops, you can find this typical iron oxide and you can find much quartz; it outcrops sufficiently often to indicate to you that it underlays the ground for many acres in that vicinity; I have never seen any veins in the ground that I speak of, and I cannot say [998] whether or not there are any veins traversing that ground, but I can say, for a hundred square feet or more you can find this typical material without veins traversing it, and there is no indication to me that veins do traverse it; you can find the outcrop sufficiently often to say that is the country rock. I have not made sufficient examination of the country immediately contributory to this exposed rock to tell you unqualifiedly that there is not a vein in that neighborhood, where it is covered with wash,—not where the country is covered with wash. There are a hundred square feet at least exposed in particular instances where this discoloration of the rock occurs, and no vein visible. The aplite in the ground in controversy is very similar to the aplite that is found there; there is also a uniform discoloration with iron oxide of the aplite where it is weathered; I have noticed no copper in the section of which I spoke last. In the section under consideration, the

(Testimony of Julius H. Warner.)

aplite is locally stained with copper,—I mean the ground of the Butte and Boston placer. I did not have reference to copper coloring in the canyon,—I had reference only to iron coloring, iron oxide coloring; wherever aplite or granite is exposed to weathering, there is an iron residuum, but I spoke of this particular case. You refer to iron and quartz in some of these samples as indicative of vein character. In the sample I presented here we have the iron coloring, as the typical vein filling. I was drawing the distinction between the iron oxide and quartz in a vein, and iron oxide and quartz occurring in country rock, to show that the constituents were not the only thing upon which to draw your judgment as to vein character. In the case of 109 and 112 we have material that is vein matter; I stated that in one sample you have comparatively fresh micas [999] and in the other sample you have not; in the usual instance, mineralization sufficient to produce that quartz and that iron oxide, have also altered the micas so that they are not observable. I do not pretend to say that the veins in Butte resemble that exactly in character and in characteristics; the general characteristics are quite similar, but there may be variations; it may be possible to find mica with a vein, but it is not indicative of vein mineralization,—rather the contrary; I am speaking of biotite. Mica is a constituent of granite; in every instance within my knowledge the mica is in existence where the vein filling contains granite not altered to the extent that the mica is eliminated. The personal equation of the

(Testimony of Julius H. Warner.)

witness, myself in this instance, the knowledge that he possessed and the judgment that he exercised enters into it very largely.

Q. And, of course, those expert witnesses being always fair, they are not at all affected by any desire to help out the side that employs them?

By Judge BOURQUIN.—Objected to. The witness can speak for himself, but is incompetent to express an opinion as to the truth or veracity of any other witness.

A. Any answer I give is as near the truth as I know.

The WITNESS.—I did not observe any pyrite in the croppings of the Mullins vein; in the case of the mineralization of the typical vein, we very largely have this mineralization by replacement; there is evidence of replacement and alteration in the Mullins tunnel, within the true vein in the Mullins tunnel; there is, outside of the walls, a later deposition and possibly substitution of chrysocolla in the granite, but evidently owing its origin to later surface waters; I see no reason why this [1000] alteration should not be going on to-day. I saw pieces of cuprite there in that place outside of the walls of the fissure, which I think has been formed within the last two or three hundred years; I think that cuprite can be forming at any moment to-day; I think that cuprite has been formed subsequent to the mineralization of the Mullins vein. When this area came sufficiently near to the surface due to the erosion of superincumbent rock for oxidizing water to

(Testimony of Julius H. Warner.)

reach that point, mineralization might have commenced, and I have no idea in years how long ago that was,—might be millions of years ago, and it might be two hundred years ago; this mineralization could have occurred within the last two hundred years; it is necessary for this section to be subjected to the action of oxidizing waters for this mineralization to come into existence. If covered with a very great thickness of superincumbent rock, one would not expect oxidizing waters to reach it. The deposition of chrysocolla in this section may have well happened within the last two hundred years and may be happening now. That does not in any way preclude the idea that it may have happened at a considerably earlier period, you are taking this as a matter of course of my judgment. It will, of course, be interesting to you to know that specimens in the geological laboratory of the United States Geological survey,—that there have been feldspars subjected to a weak solution of copper sulphate, under ordinary conditions of temperature and pressure, and found to precipitate chrysocolla; the cuprite may have come into existence at any time after this area was subjected to descending surface waters, and it may be occurring now. It may have occurred within the last two hundred years, or it may have occurred considerably earlier than that time,—I would give no judgment as [1001] to years; some of this might have been deposited within the last twelve months; I believe the mineralization of the vein matter occurred previous to the time when this area

(Testimony of Julius H. Warner.)

was subjected to the action of downward moving solutions,—meteoric solutions; the walls of that vein are comparatively fresh granite; the vein matter itself is composed very largely of iron oxide and intensely altered granite. The occurrence of that iron oxide is in little pits. It occurs to a great extent,—and having seen veins underground and then seeing the vein in the oxidized zone, one can note that these places now occupied by iron oxide pits were without much doubt, the place once occupied by iron pyrite. Further, along this vein there is not the movement and crushing that you note in a fault. The material stands there as it has probably stood since alteration, without moving. If you wish, I brought in a small specimen of this vein material; I will be glad to show it to you and point out in the structure and character of the vein material certain characteristics which make me think it has been derived from ascending mineralizing solutions. In the case of a vein there is not necessarily any movement so as to bring into existence this clay; I doubt if there has been much, if any, movement along this vein subsequent to its origin. The existence or nonexistence is suggestive of this, that this is not a fault zone; I am not able to fix any ages for them; the fault if it changes the course of a vein, is suggestive of a later origin; the ultimate causes that produce fault and vein fissures may be the same. Outside of the walls of the fissure, except perhaps to a very limited extent nearby, this granite has not received the alterations which commonly accompany vein mineraliza-

(Testimony of Julius H. Warner.)

tion; this granite, however, has been somewhat weathered and has [1002] received some alteration of that produced by downward moving meteoric waters, and by reason of that the granite has received some copper deposition. I made one assay test; I took a piece of perhaps the most highly mineralized granite away from any slips, which granite was somewhat stained with chrysocolla and had the feldspars segregated from this material,—and an assay made of the copper content, to determine to what extent that discoloration was due to copper; I had in mind the joint planes; I found the same evidence of mineralization there that I have spoken of in this cross-cut; there are at least five joint planes visible in that shaft, but I did not notice any evidence of slipping along these planes in the shaft; I encountered one of these planes just at the point where the cross-cut from the Mullins vein enters the Hornet shaft, just about on the floor of this portion of the cross-cut; I could not state the width of the plane; the width of the material that is discolored to a considerably greater extent than the adjacent granite is probably under three inches; there are perhaps some points where this discoloration extends with a little more intensity, farther from the planes, but in general I would say that such discoloration was not more than three inches in width. I would not say that the three-inch material was mineralized sufficiently so as to be ore; if the material within that three inches occurred in larger size, it might be mined as ore; taking the material itself, I do not know what

(Testimony of Julius H. Warner.)

percentage of copper it would carry; that plane is visible in the shaft, and in sinking that shaft to that depth you would strike that plane; I would judge that it strikes about across the direction of the cross-cut; it is visible on the west side of the cross-cut. There is another plane about seven feet above the bottom of the [1003] shaft, and I have noted one or two others that I did not sketch. That vein is very similar to the one above noted; it is only noted on the northwest side of the shaft and I would not be certain that it extended across the shaft; I noted it only on that side, and I believe you would encounter it in sinking that shaft, and mineralized very similar as the plane that is higher up; I think there is some material there that would be ore, if occurring in sufficient quantities; there is another seam visible in the shaft, and also in the lower cross-cut, at a distance of perhaps two feet above the bottom of the shaft, on the northwest side,—on the north side, following up through that little cross-cut; that is a third plane; the material between those planes in the shaft is granite, only altered by weathering agencies; the alteration is very slight. The alteration I speak of is due to weathering and to the action of descending meteoric waters, carrying some copper salt in solution no doubt, and I think that there can be found some discoloration in the fresh material between the planes mentioned. I believe the chrysocolla could be deposited in those present workings to-day, and of course they might have been deposited a week or so before I saw it; if the discoloration was seen there about

(Testimony of Julius H. Warner.)

ten years before I made the examination, I would say that undoubtedly the discoloration was due to water that came there before that time. There are two other planes. Due to the fact that these other two dip rather with the shaft, I did not map them, but I noted them; second set of joints, noted strike about north and south, dip about fifty degrees to the west; there is some chrysocolla noted in these joints also; one noted to the west side of the lower cross-cut, on going into this cross-cut. The other noted about seven feet up from the bottom of the south side. The first three dip to the north, perhaps a little northeast from the shaft; the upper one you are able to follow for perhaps ten [1004] feet along the floor of the cross-cut; there it goes into the floor, and I do not say whether it ends, and if it extended in that course and direction, it would ultimately reach the fissure, if it did not stop; the next one below I only noticed on one side of the shaft, and could make no statement as to whether it extended an inch, five inches or more; I could not tell because the solid ground prevented my doing so; one or two of the other planes could be followed somewhat farther. The lower one could be followed through the shaft a total distance of about ten feet, and dipping into the floor of the lower cross-cut. Taking those planes there with the mineralization, and the rock between them, I would not say it was such that the prospector would be justified in locating that ground, with the hope of finding ore in that ground, but you find certain rock that carries sufficient copper so that

(Testimony of Julius H. Warner.)

if it occurred in sufficient amount it might produce an ore; I do not know what that three inches would average, even if there were eighteen inches there; I do not think three per cent copper in that material could be handled commercially; I think eighteen feet with four per cent copper, a person would be entirely justified in locating it; he would not be justified in locating that if it assayed three per cent copper because he could have no hope of handling that material at a profit. The lead there runs for a greater distance than it is exposed, and my judgment would be that it would continue in a westerly direction, and easterly direction some distance beyond the points where it has been developed; I have seen fissure veins that have not had an extent, and on the other hand, I am not saying it might not go several thousand feet,—I would not expect that it would go a mile westerly; a vein of that size and character would not indicate to me that [1005] it had any extent of a mile, because veins a mile long are exceedingly rare; there are very many more veins that are shorter, in my experience, that have that extent; where we have a true fissure vein, such as we have here, the change from one rock formation to another rock formation may discontinue a fissure vein. A fissure vein may go to a certain extent, and the same stresses that produced that vein be satisfied by a somewhat similar vein; those are two points; I do not know of that vein existing in any formation except where I saw it in the granite. I don't believe there would be another formation for a mile in either

(Testimony of Julius H. Warner.)

direction, excepting aplite,—perhaps quartz porphyry; I told you that one vein might stop and the stress which it satisfied be taken up by another parallel vein, extending perhaps in the same direction; I have seen such cases; that might or might not occur; and in this instance there is a possibility that we might encounter the case where it might not occur, and that feature, as affecting the length of the vein, would likewise be eliminated. I took particular notice of the strike of the Mullins vein at the extreme eastern end; that has been somewhat offset. The strike of that portion is north fifty degrees east and the dip is fifty-eight degrees to the south. This strike is but slightly different from the strike throughout the remainder of this vein; I took another strike on the lower drift; the strike in the lower drift east, is approximately the same. I believe in the vein system here, in the case of replacement mineralization, it is possible for the country rock by weathering and by descending waters to become so mineralized that it has been shipped as ore, in certain faults where there was a good opportunity for downward moving waters. In this particular ground over here, I believe [1006] we have some faults and joint planes; the faults would afford a ready movement for descending waters, and if the waters were mineralized, these joint planes could take up the water likewise and carry it through the body of the granite, and during that time, some of the copper mineral might be deposited, and this chrysocolla could be deposited in that way; there is,

(Testimony of Julius H. Warner.)

so far as I could observe there, by reason of the breaks, ample opportunity for the dissemination of this water, and also the deposit of this cuprite, which I saw; cuprite, with the rock altered, would have some significance to a prospector.

In tunnel No. 36, I said that the easterly 75 feet of it was in bedrock and that the material is principally granite, and there are two cross-cuts in there running to the north, and also there is a cross-cut running southeasterly; I remember no staining other than the staining with iron oxide. I could not state definitely whether that staining is noticeable in the cross-cut we are now considering; there was nothing materially different from the ordinary rock to attract my attention occurring near the surface; I think without any doubt there is some iron oxide discoloration on the bedrock. Defendants' Exhibit 108 is considerably altered; I see some mica in this material; it has probably gone largely to chlorite; when you have surface weathering, the micas usually alter to chlorite, and when we have no weathering and have mineralization the mica usually goes principally to sericite; I found quartz in this material; this material before weathering was chiefly aplite; some of it might have been granite; that material in a fissure would have no particular significance to me; that matter in a fissure would not necessarily be vein matter; if it was found within a fissure it would be fissure filling; it would be vein matter if it was [1007] further mineralized by those mineralizations which we note as typical of vein material; we

(Testimony of Julius H. Warner.)

also have iron oxide, which is a mineral; iron oxide alone in a fissure might indicate to me that it was vein matter; no further mineralization than iron oxide is necessary to make a material vein matter in my judgment. The character of the alteration which you there see is not typical or indicative of vein mineralization; the fact that there is not there the iron pyrite that would be brought into existence through the access of ascending waters or vapors in one indication; if present that would lead me to believe this might be vein matter; and besides you get very fresh micas that are not altered as characteristic in the alteration accompanying ascending mineralizing solutions; I think the alteration of the feldspars is essentially kaolinization, that is not ordinarily found due to the action of ascending mineralizing solutions; it is conceivable that in a fault fissure at greater depth than that, circulating waters from surface origin might have had access to that portion of the fault and not have had access to this portion, and might have deposited there chrysocolla; this material in a fissure would not suggest the possibility of the existence of a vein; I note no alterations there, other than you can find in the altered country rock. I stated before that it was quite possible that such material might be found in a fissure. In tunnel 36 I have noted at least three visible slips, essentially north and south; one near the face of the tunnel, dipping to the west; one in the eastern northerly cross-cut, dipping to the east, another in the cross-cut in the tunnel, between the two northerly cross-

(Testimony of Julius H. Warner.)

cuts, dipping to the east. I went into tunnel 37, which is the tunnel next west from the Mullins tunnel; I went into that portion [1008] of the tunnel which lies east of the north cross-cut and went through the north cross-cut; I did not go into the southeast cross-cut; I examined the northerly cross-cut; there was some local discoloration of the aplite by chrysocolla; the roof of the tunnel at the face is just about bedrock on that little northerly tip of the tunnel, you may call it,—the most easterly cross-cut north,—aplite appears in the bottom of the tunnel; there is also a little aplite appearing to the easterly point of this tunnel; most of this tunnel, however, is in the wash. I also examined tunnel 35; I have sketched in in pencil a very short cross-cut to the north, at the east end; there is about ten or twelve feet of the east end of that tunnel in bedrock, which is granite and aplite. There is a fault fissure in shaft 19,—that is the southerly dip shaft; the strike of the fault is north and south, and there are lines visible,—movement along fault planes is very readily visible; the fault plane is perhaps an imaginary line; the movement is visible and crushing of the rock; this movement is manifested by lines; I don't see any reason why we cannot speak of lines of movement; these lines have a northerly and southerly course; there are two well-defined, representatives of this fault fissuring, one in the bottom of the shaft, visible to the west side, and along the north side on its dip; the other very clear line is in the back; behind the timbers to the east side of this shaft; the material

(Testimony of Julius H. Warner.)

is chiefly clay, and there are perhaps some rounded quartz fragments in this clay gouge; the walls are granite, which I have seen; I have spoken of two representations of this fault movement; two lines of movement, if you will, between these two representations of this fault,—the hanging-wall of one and the footwall of the other,—is fresh granite; there is, [1009] between these two well defined walls of movement, granite that has not received the same extensive crushing movements and still retain its original granite structure and character; these are the walls of that fault fissure, that I am speaking of and are exposed in that shaft; to explain, from the parallelism of these two exhibitions of faulting, I would presume that they had been formed due to the same movement. Then between these two well-defined fault gouge representations, there is granite which has not been so crushed and altered. This granite may well be considered the footwall of the easterly fault and the hanging-wall of the westerly fault; there are two fissures there, fault fissures; I think my explanation covered that; I have referred to both of them as having walls; I described the westerly one as two and a half feet wide plus,—that is to say, I have discerned the hanging-wall of that fault but not the footwall; it may extend farther than two and one-half feet; I gave you one wall of each; the other, as I stated, is in the back, behind timbers; it would be at least one foot in width; as much information regarding that cannot be obtained as regards the other; I saw the footwall of it, but not the hanging-

(Testimony of Julius H. Warner.)

wall; not seeing both of the walls I cannot give the width of the fissure. The dip is not definitely ascertainable; on the westerly one I can obtain dips, either of which would apply,—from twenty degrees to forty-five degrees to the east; the other I would say to be a dip about fifty degrees to the east; there is very heavy clay gouge, in the case of both fissures; it was not mineralized, but was somewhat iron stained, where there was iron oxide; that is mineral. The major portion of both of these faults is not stained; it was a very typical blue clay, without staining; certain portions more near the [1010] country rock still have some iron oxide in them; there is very great evidence of movement of the material in the clay I found there,—a northerly and southerly movement; it is somewhat west of north; in general, northerly and southerly; I did not bring a sample; in the fault fissure itself I noticed nothing other than what I have spoken of; very similar material to that is shown in the oxidized region of the fault in No. 21 shaft; oftentimes faulting has occurred along veins with the production of similar material; I have reference to a movement of the walls of the vein, or the walls of vein material and country rock material. Fault movement may occur along veins, in the vein material itself, and having this movement along the vein, and of the material, we may find in the vein material, material quite similar to what you find in the shaft; I believe it to be the same kind of material. I say this is a fault fissure rather than a vein fissure because it is not vein min-

(Testimony of Julius H. Warner.)

eralization; if there was chrysocolla in this material found in the bottom of the shaft in sufficient quantity to warrant its development with the expectation of finding ore, and there was some copper oxide, it might be a vein, with a strike north and south. I have not been down to examine the Donner vein for two years and a half; in coming to the surface I assumed as the average dip the average shown between a certain point on the twelve hundred and a point a hundred and forty-five feet above the eight hundred, eight feet south of the occurrence of the Donner on the eight hundred, which information is obtained from the map of the workings with regard to the stopes on the twelve hundred and the vein above the eight hundred for some distance; I figured the dip evidenced by the occurrence of the Donner a hundred and forty feet above the eight hundred, assumed to be [1011] eight feet south of where it occurs on the eight hundred,—that is, one end of the line; the other end of the line is where the Donner was developed on the twelve hundred, and drawing a straight line between those two points; the angle of that dip, as I remember it, was seventy-four degrees and thirty minutes. Wait a moment and I will O. K. that. The angle was seventy-four degrees and thirty minutes. This is the twelve hundred. (Referred to cross-section map.) This is the eight hundred. Those are survey points. This is the point eight feet south of the occurrence in the Donner on the eight hundred. This line represents a straight line between this point and this point, projected to a horizontal plane at the elevation

(Testimony of Julius H. Warner.)

of tunnel 31; the elevation of the Mullins tunnel is 5752.29; the dip of the Donner in getting from the twelve hundred to the eight hundred is very much the same from the twelve hundred to the eight hundred, and is somewhat flatter than the dip I have assumed, being a trifle over sixty-nine degrees; I made the dip a little steeper, by reason of the vein being somewhat steeper above the eight hundred; it was considerably steeper in the computation I made, almost vertical. I have no reason to suppose that it again went back from that almost vertical dip to the inclined dip below the eight hundred level, other than the fact that it is ordinarily principally considerably flatter than the dip taken between the eight hundred and the point a hundred and forty feet above. If I projected a line with the same elevation as the Mullins tunnel, with a dip almost vertical, it would be some considerable distance north of the red line I have shown; I am giving it a dip that I have assumed between the eight hundred and a point one hundred and forty feet above the eight hundred. (Witness draws line on cross-section map.) [1012] That would place the intersection of the vein with a horizontal plane at the elevation of tunnel 31, one hundred and eighty feet, approximately, north of where I have drawn the red line on this map. (Referring to Complainant's Exhibit 14.) North of the line A-B on Complainant's Exhibit 14. I will draw the line across on this map; I will designate that C-D at ends of line; I have not used my own judgment very much on whether the Donner vein goes into this

(Testimony of Julius H. Warner.)

ground or not; if the Donner extended easterly, I think quite likely it would go into this ground; on the continuity and extent of the Donner as developed in the Pittsmont, I would think it quite probable that it might extend eastward into his ground. If I made a report as a mining engineer on this ground, I would say it might possibly extend into this ground; I would state the facts in the case as I know them; I would not undertake to say that the Donner vein went into that ground or that it did not; I would say to anyone who employed me what I have said before; I will not say whether a vein will or will not extend on its strike or dip; I will attempt to give them the facts in the case as I know them and leave something to their own judgment. I do not occupy the position that in every instance my judgment is going to be infallible. As a general proposition if you have traced a vein for five hundred feet, for a thousand feet, and it is continuing strong, it is not unreasonable to suppose it may extend another hundred feet, but even that is supposition. In this case we have a vein that is developed three thousand feet, and there is no reason to believe that it will stop immediately beyond the present workings; my judgment would be that it would extend some distance beyond where it is at present shown, but I would not subject my judgment to a matter of feet; a fault may [1013] interrupt a fissure vein. A decrease in mineralization may interrupt its vein character. Veins do not continue indefinitely; the vein character of a fissure vein may be terminated by a decrease, and nonexistence of

(Testimony of Julius H. Warner.)

vein mineralization, too; in our experience, we have never seen a vein that continued indefinitely so that it must be judged that a vein stops sometime; the decrease of vein mineralization would affect the fissure as a vein. The fault does not necessarily change the strike of the vein; it may offset a portion of the vein; when you get beyond the fault plane you may encounter the same vein again, and if a strong vein continues up to a fault, it is generally the case, possibly, that it continues similarly beyond the fault, supposing the fault is subsequent to the vein; it is not reasonable to suppose that these fissures continue indefinitely. I do not think I ever saw a fissure three miles in length; this Donner vein is exploited to about three thousand feet in length, and I have seen a fissure apparently the same throughout, which covers about three claims in length,—about forty-five hundred feet in length; I do not think that I have ever had occasion to examine a longer fissure than that, but I do not know whether the fissure ended at both ends that I speak of; it was still in existence when I last saw it at either extremity.

Redirect Examination.

(By Mr. SHELTON.)

The WITNESS.—In speaking of origin of veins and the way in which the vein fissures were formed, and the cooling of joint cracks in the granite, due to a cooling of the granite, various [1014] fractures may owe their ultimate origin, I believe, to the cooling and consequent shrinkage of the granite. Their formation differs, in my opinion, in this way. The

(Testimony of Julius H. Warner.)

joint cracks are local, due simply to contraction and fracturing of the granite in that locality. Considering this large mass of granite that we have here in Montana, extending from Butte to Helena, and having great depth, it is probable that in its cooling there were set up strains which were relieved at some point by intense fracturing; in that way, I believe the fissures, which were later filled by veins in this section, might have been formed.

By General NOLAN.—Move to strike out the answer of the witness as not responsive to the question.

Q. What I want to get at particularly, Mr. Warner, is the distinction,—I want you to distinguish, if you can do so, between the joint planes, or the cooling cracks,—what you call the cooling cracks, and the vein fissures, in this camp.

By General NOLAN.—Object to that as not redirect. We got to that in chief, and he testified to some length on cross-examination in reference to it.

A. The joint cracks are local. They do not have continuity. The fissures are extensive. They are of great length, of great depth, and they are usually nearly vertical. There is a certain parallelism in the vein fissures of this camp. The joints do not necessarily approximate the vertical. They may follow flat dips or steep dips. Those, I believe, are the chief points of difference.

The WITNESS.—In ordinary work, joint cracks are found, very many of them, terminating perhaps within the width of a cross-cut or drift; there is some parallelism, I believe, between [1015] various

(Testimony of Julius H. Warner.)

sets of joints, but there is not parallelism between all joints; I believe the joint cracks join in such a way as to form the boundaries of a more or less regular fissure, under ordinary cooling conditions, where other strains are not set up; there is no such peculiarity of vein fissures; joint cracks may be very short, less than two feet in length; I would not be surprised to see a joint crack thirty feet in length, and their continuity is similar, and where encountered there is usually a regularity of strike and dip throughout their extent, but you would not find every one of them in the same strike in the same locality; you are apt to find a parallelism between certain sets, perhaps two or three, but these different sets may vary widely in their strike and dip.

Q. Now, what is the difference in these different kinds of fissures,—vein fissures and the joint cracks? You started to go into that a little while ago.

By General NOLAN.—Object to it as not redirect examination. The matter has been gone into on his examination in chief fully.

A. I think I rather fully spoke of that just now, stating that the joint cracks are local occurrences, due to cooling contractions and fractures in the granite, but that the vein fissures represent more intense differential strains, which strains may be set up, due to this cooling and contraction of an igneous mass, but which appear in one place, perhaps in one locality.

The WITNESS.—The joint cracks are due to cooling and contraction. A fissure might be, I believe,

(Testimony of Julius H. Warner.)

forty-five hundred feet long in this camp. The vein fissures ordinarily have a length of a hundred or more feet. A fault fissure, cutting through a vein fissure, may have an effect of offsetting two [1016] parts of a vein, relative to one another.

Q. Now, if you assume that the Donner vein continues indefinitely in an easterly direction, before you can determine whether it extends into the ground in controversy, you may state whether you would first have to determine whether or not there are north and south fault fissures between the eastern extent of the development on the Donner vein and the ground in controversy in this case, and also the character of such fault, as to whether or not they were normal faults, the extent and direction of the dislocation—

By General NOLAN.—Object to that as leading, also object to it as not redirect.

A. Any fault in that section might have the effect of off-setting the Donner vein, assuming that it extended easterly so that it might or might not enter the ground in controversy.

Q. You may state whether or not you could venture an opinion as to the Donner vein extending into the ground in controversy in this case, without knowledge of the existence or nonexistence of fault fissures intervening.

By General NOLAN.—Object to that as leading, and also as not redirect, and also as an attempt to cross-examine his own witness.

A. No, I would not.

The WITNESS.—I took a sample from the Motheral vein, within the oxidized zone, which is De-

(Testimony of Julius H. Warner.)

fendants' Exhibit No. 112. I do not think I ever saw the Donner in the oxidized zone. The material I have brought here as a part of the oxidized zone of the Motheral vein, and the occurrence of vein material in the oxidized zone in the Mullins vein have many points of similarity; there is a great deal more quartz than in the Mullins vein. [1017] In some portions of the Mullins vein I found chrysocolla in the oxidized zone, but did not find such material in the Motheral vein within the oxidized zone. None of the joint planes which I found in the cross-cuts from the Hornet shaft are shown to extend into the Mullins vein; in some instances they are discontinuous in these cross-cuts, so that it is noted they terminate before reaching the Mullins vein. In other instances, I have no data.

Q. Was there anything to indicate any connection between those that you encountered in the south cross-cut,—the lower cross-cut,—with those that were encountered in the upper cross-cut?

By General NOLAN.—Object to that as not direct.

A. No, there is nothing that evidences a connection between the slips and the joint planes in the upper cross-cut and in the joint planes in the lower cross-cut.

Q. What was the strike of those in the upper cross-cut,—how does the strike of those in the upper compare with those in the lower?

By General NOLAN.—Objected to for the reason that it is not redirect. The witness was questioned respecting those matters in his examination in chief.

(Testimony of Julius H. Warner.)

A. The strike is quite similar for most of these joint planes. There is also,—there are also two joint planes, one of which occurred in the lower cross-cut, that has a dissimilar strike and dip, and are parallel with each other.

Q. Why do you characterize them as joint planes, instead of calling them slips or fissures?

By General NOLAN.—Objected to as not redirect.

A. Well, they are not continuous.

[1018] The WITNESS.—They are not continuous, because in certain instances you can note that they do not extend across a cross-cut. That is the lower cross-cut,—the second important one south of the Mullins vein,—neither extends to the bottom of the cross-cut, nor through the west side.

Q. Now, you may go ahead. You mentioned their lack of continuity as one thing that caused you to call them joint cracks instead of fissures.

By General NOLAN.—Objected to for the reason that it is simply traversing the same ground that has been covered upon his direct examination, and the evidence acquires no greater force by being repeated.

A. They are nearly,—they are much flatter than the fissures.

The WITNESS.—They are not all flatter; many are flatter. They have divergent strikes and dips between different sets; the flatter ones I noted are these that strike about across the cross-cut and dip towards the Mullins vein; those are the ones seen in the lower cross-cut; the apparent parallelism of at least two sets, within a small area, indicates joint cracks. If

(Testimony of Julius H. Warner.)

they were cracks caused in the walls of the fault by the movement of the walls, I do not think such cracks would have the parallelism and straight line effect, unless this was produced along lines that were about to cleave, and had not already done so.

Q. In your cross-examination, you were asked whether or not the joint planes did not furnish a channel for the carrying of the surface waters into fault fissures. I think you said they would furnish such a channel. I will ask you whether or not you meant by that that they would afford a direct channel.

By General NOLAN.—Object to that as leading.

A. No.

[1019] Q. State just what you meant.

By General NOLAN.—Well, of course, he can tell us now, in the light of the suggestion made. I submit it is not the proper way to examine a witness, to incorporate in the question the answer desired, and upon objection being made then to escape the consequences of the improper question by asking a proper question.

A. In the solid rock material, waters,—solutions,—do not have the ready opportunity to move that they do where there are fractures. In so far as there are joint planes in the solid rock, they furnish a readier course of movement for waters than does the solid rock. They are not necessarily continuous. There is no doubt but what the solution can travel along a joint plane faster than it can through the country rock. It has got that much of a start already. These joint planes, while not continuous,—while no one may

(Testimony of Julius H. Warner.)

be deemed continuous,—exist throughout the rock and waters can readily move from one to another, *and to another*, and so move through the rock more expeditiously than if it were not fractured. I mean by descending waters, meteoric waters,—waters drained by rainfall, which move through the upper portion of the earth's crust, generally descending; rainfall is an example; the copper may have been derived partly from a wide dissemination of small extent of copper in the granite; and I believe that is a continuous process; it may be going on at the present time, and may have gone on ever since this country was subjected to such downward moving waters of which I speak; copper and iron sulphide from weathering ordinarily go to copper sulphate and iron sulphate which are readily soluble salts, and they are soluble in water at ordinary temperature and pressure; in this country in controversy of which we are speaking, a considerable amount of copper [1020] is deposited in the relatively fresh granite,—granite that has not been altered, and where it is deposited in comparatively fresh granite its looks like green chrysocolla,—some of it is pale green, and on some of these joints you get a much deeper green; such a deposit is very general in the following openings; tunnel 31, the Vesuvius discovery workings, No. 34 tunnel, some in No. 37 cross-cut; there is no reason to suppose that this slight deposit of chrysocolla in the granite is confined to the openings I have mentioned; I would expect in the section in which those openings are found, to find more of the same discoloration; it also is deposited in faults and other fractures in the granite,—

(Testimony of Julius H. Warner.)

faults, slips, joint cracks, and veins; the deposit was to some extent existing in the Mullins vein, and perhaps so extensive in the immediately adjacent wall rock. It is my belief that the Motheral vein, for instance, the waters have quick opportunity to leave the leached matter they there encounter. It is very porous; further the rock adjacent to the Motheral and the vein filling contains very rarely any fresh granite, which I believe acts upon these copper solutions, tending to precipitate chrysocolla; in the section of which we speak, there is much fresh granite; the waters are probably more delayed in movement, have not the same ready escape, and for these reasons a deposit of chrysocolla is made. When I speak of a ready escape for the water in the Motheral vein I mean that the Motheral vein gives a much readier opportunity for water to move within it, than the granite in this eastern section.

Q. The Motheral vein is a fissure, is it, which affords a channel for the movement of the water?

By General NOLAN.—Object to that as leading.

A. Yes.

[1021] The WITNESS.—I believe the eastern end line of No. 888 coincides with the west end line of the Butte and Boston placer; there are ten veins that have been worked within Application 888; I think most of those veins offer a readier opportunity for water movement than does the granite. On the Donner vein I took a dip which is equivalent to a departure of eight feet in a distance of a hundred and forty feet vertically, and then I projected a line so that it would intersect with a plane on a level with

(Testimony of Julius H. Warner.)

tunnel 31, which line was on that dip, projected from the eight hundred up; I have seen something above a hundred feet of the Donner vein above the eight hundred foot level,—I believe it has been developed about a hundred and forty feet above the eight hundred level.

Q. Now, in this vein below the hundred and forty foot level, is the dip on a straight line, or are there certain,—for instance, certain portions of it that are relatively flatter than other portions?

By General NOLAN.—Object to that as not re-direct. The witness got into that fully in his examination in chief.

A. The dip as a whole, between the eight hundred and twelve hundred is rather regular, considerably flatter than the dip here assumed above the eight hundred.

The WITNESS.—There is nothing to warrant the assumption that the Donner vein, as it existed before the removal of the earth which was at one time above the present level of bedrock at that place was the same from the eight hundred up, only that for that distance it appears to be straighter than the average of the entire vein. It is a matter of judgment whether it continued originally on that dip to the surface; I would not expect that it would continue to the surface as nearly vertical [1022] as that dip. I determined as the departure from the vertical of the Donner vein on its dip down to the twelve hundred foot level, from the point assumed, a hundred and forty feet from the eight hundred.

(Testimony of Julius H. Warner.)

Q. I want to find the distance horizontally from the Donner vein on the twelve hundred foot level to the point of intersection of the projected line with a plane on a level with tunnel 31.

By General NOLAN.—Object to that as not re-direct.

A. If I understand you, you want to find the horizontal distance between the Donner on the twelve hundred, where I have taken this section?

Q. Yes.

A. South to the point where a line extended from the eight hundred up to the horizontal plane equivalent in elevation to the tunnel 31, this line being on a dip such that in one hundred feet of elevation above the eight hundred level, there is a departure of eight feet to the south,—what is the distance between the twelve hundred and the point of intersection with the plane above referred to.

The WITNESS.—I placed the line C-D on the map. This last calculation is in all respects similar to the first calculation, with the exception that from the eight hundred level up to the intersection with the horizontal plane at the elevation of tunnel 31, a steeper dip was taken,—that dip representing an offset of eight feet in one hundred and forty; an oxide of iron is limonite; iron rust is a more popular term for iron oxide, and it is reddish color, and the samples brought here from tunnel 36 compare fairly well with the various showings of iron oxide that have been presented. Granite is the general [1023]

(Testimony of Julius H. Warner.)

country rock there; the result of weathering and disintegration on the granite is that the iron oxide remains in place of the mica; it may be considered a replacement of the mica; that disintegration has taken place very generally in that vicinity, and the occurrence of iron oxide in that locality, speaking of the bedrock surface, is very general. I had a sample of the Mullins vein; here it is, which was taken near the surface of the lower drift on the Mullins vein.

By Mr. SHELTON.—We will offer this in evidence.

By the EXAMINER.—I will mark that Complainant's Exhibit 30.

The WITNESS.—The complete alteration of the original rock content, the large amount of iron oxide and its method of occurring in the little pits throughout the entire mass, indicates that it was mineralized at one time by ascending mineralized solutions. This exhibit consists of two pieces of material, and these little pits occur in both of these pieces,—perhaps more characteristic in the one which you hold; those little pits are now iron oxide and indicate to me that they have resulted from the weathering and alteration of iron pyrite to iron oxide; in these samples there is the absence of fresh, unaltered, granitic minerals, which are commonly found in many, in much of the surficial altered granite; those granitic minerals are quartz, feldspar and mica chiefly, some hornblende, Where there has been an intense mineralization by ascending solutions, there is usually a complete de-

(Testimony of Julius H. Warner.)

struction and replacement of the original granitic minerals, with the possible exception of quartz.

Recross-examination.

(By General NOLAN.)

The WITNESS.—Five hundred and twenty feet was the point of [1024] intersection in the first computation in the projection of the Donner vein at the eight hundred level, south,—approximately two hundred and eighty feet; the elevation I have computed here is eight hundred to the surface of the ground, and to get to the plane of tunnel 31 we used one hundred and sixty feet above, and computed on a basis of eight feet to a hundred and forty; I assumed the Mullins tunnel was ten feet lower,—that may be somewhat off,—I assumed that tunnel 31 was ten feet lower than the Mullins; we have data in the Pittsmont office on various shafts and tunnel elevations in this camp. I took it from there; I also, before obtaining that, took a rough estimate as to this elevation, by taking my compass and using it as a hand level, and sighting on the new Pittsmont stack; I judged that this tunnel was about one hundred and fifty feet above the shaft collar on that basis. The greatest dip of those leads that I have is seventy-six degrees, which would probably be considerably more than eight feet to a hundred and forty, which would be six per cent, which means six feet in a hundred. The age of granite in the ground in controversy is just about as old as the granite in the neighborhood of the Motheral vein; the granite adjacent to the

(Testimony of Julius H. Warner.)

Motheral vein has been intensely altered by these ascending mineralizing solutions for hundreds of feet away from the vein, and that altered material, I believe, does not have the same precipitating effect upon solutions carrying copper that the fresh granite may have. In the case of the Mullins vein we have the fissure there to accommodate the water, just the same as you have in the Motheral vein, and, as a matter of fact, in the neighborhood of the Motheral vein, we have fault fissures that equally afford facilities for the descent of the water; but taking this [1025] section as a whole, as compared with the Pittsmont, for instance, adjacent to the Motheral,—I believe there are more opportunities in the Pittsmont for the water to get away in a hurry than in this section. I believe the continental fault prevails up there in the neighborhood of this ground in controversy, and to a large extent that continental fault system affords a ready means for escaping water; I would not say that you had more fractures in this eastern country than in the Pittsmont. In reference to the coloring of the granite, the fissure system or slip, must be less than it is in the Pittsmont, if that reason be assigned as the sole reason for the difference. We have the ascending solutions in the Mullins vein, but not the adjacent alteration. In the case of the Parrot vein, I would say the mineralization was from ascending solutions rather than from descending solutions; and generally it is true on the Butte hill, that this granite was altered so that there would not be much chance

(Testimony of Julius H. Warner.)

for this precipitation of chrysocolla, but there are some portions of fresh granite on the west side, which would act as fresh granite on the east under similar conditions. We have some cuprite in Defendants' Exhibit 38, and chrysocolla; cuprite is the result of oxidizing processes,—that is, oxidizing processes exist in these upper descending waters but they do not exist in the ascending waters, so I would say that I believe these to be due to the descending waters, closely related to the cuprite, but whether there should be cuprite in place of chrysocolla, I am sorry to say I have no solution. Defendants' Exhibit 102 is principally chrysocolla, and somewhat altered granite. Any of this alteration could have been,—there is quartz there also,—any of this alteration could have been brought about, and probably was, by [1026] descending waters. There is nothing in that to suggest to me that any of the conditions confronting me were occasioned by ascending waters; on the contrary, there is considerable fresh mica in this that has not been altered. I would not be surprised to learn that that came from along the wall of the Mullins vein, on the easterly end of the drift; there were ascending waters that came up through that fissure and vapors, through the main fissures generally, but you will also find along those walls, this typical alteration, due to descending waters. If it was along within the main area of mineralization it would have been somewhat affected by the action of ascending waters. Sample 102 is composed essentially of iron oxide and some quartz, and altered granite; in

(Testimony of Julius H. Warner.)

portions of this material I can show you very distinct, unaltered micas; in certain of the pieces from sample 102 I find the unaltered mica. In speaking further of this sample 102 I wish to say that these portions of it in which the mica is unaltered, I would not believe were within the definite boundaries that were affected by ascending solutions. I have noticed very similar material along both the foot and hanging-walls. I think the ascending solution would reach the material within the walls, but it is my opinion that much, if not most, of this material is outside of what I would consider the wall of the Mullins fissure. Some of the material in defendants' material is somewhat indeterminate in its present position as to origin; certain of the material shows the rather fresh characteristics which might be found in a granite altered simply by surface weathering; we find no evidence there that the iron pyrite has been displaced through atmospheric action, and the oxide substituted in its stead,—no such characteristic alteration. In certain instances I do not [1027] think ascending solutions affected this material. In that piece there is an alteration by the introduction of chrysocolla; I see no alteration in this particular piece that could not have been brought about by surface action or action of surface water; the chief alteration here that I see is the substitution of chrysocolla for other materials, and that has been formed by descending waters. If the material in the sample I am now examining was in sufficient amount to warrant commercial mining I believe it would be vein matter. I

(Testimony of Julius H. Warner.)

would not say definitely that you have aplite in either 102 or 103, but certain of that quartzose material appears to me in 103 to be quartz or aplite origin; I do not see the same suggestion in No. 102, and taken as specimens, away from their environment, that is the chief difference that suggests itself to me; in all other respects they compare very well; in either case they contain chrysocolla, iron oxide and some unaltered micas; iron oxide is oftentimes simply rust, where it occurs in rusted iron; I believe most of the iron that is contained in those samples shown me could have been deposited from the breaking down of micas, and the movement of the iron material. Where iron pyrite is subjected to the active weathering agencies it usually becomes iron oxide; I showed you this morning a piece of rock which contained some iron pyrite from the oxidized zone, but we could hardly consider that that could have been subjected to oxidizing agencies. In Complainant's Exhibit 30, these various pits, you will notice are individual all through this section,—very heavy, large in amount; I believe myself that they represent what was originally iron sulphide,—pyrite; another might be chalcopyrite, copper and iron and sulphur; I would not expect on the other hand to find such a continuous, individualized pitting through this [1028] area, to this extent, from the altering of micas in granite rock; those are the two chief sources by which we may derive our iron in this iron stain,—that is, micas and iron sulphide; in my judgment, this has been obtained

(Testimony of Julius H. Warner.)

from iron sulphide, rather than from mica.

(Signed by witness before Examiner February 17, 1912).

[Testimony of William B. Fisher, for Plaintiff.]

[1029] WILLIAM B. FISHER, duly called and sworn as a witness on behalf of the complainants, testified as follows:

Direct Examination.

(By Mr. SHELTON.)

The WITNESS.—My name is William B. Fisher. I reside in Butte, and am a mine manager, and at present am General Manager of the Davis-Daly Copper Company, and my duties are to attend to the proper operation of the mine, covering both exploration and producing ore, carry out the finances of the company at this end of the line, purchasing supplies, examining properties that they may wish to purchase, as mining engineer, and selling the products of the mine; I act also as superintendent of mining operations, and as such am required to determine the boundaries of veins; in order to successfully superintend the mine, it is absolutely necessary to discover and make definite boundaries of the ore-bearing veins, and the barren or wall rock which encloses them; I have been an active miner or superintendent since April 2, 1879. I entered the Massachusetts Institute of Technology, in Boston, Massachusetts, in September, 1874, taking the course of mining engineering; I *remember* there until March, 1879; my first active work was in Leadville, Colorado, in the

(Testimony of William B. Fisher.)

spring of 1879; for about a year I did assaying on one shift and worked an eight hour shift underground at the same time; in 1880 I entered the employ of the United States Government, under the title of special mining expert for the first census—first mining census, which was under the head of the United States Geological Survey. My duties in that were to examine every mine in certain districts, going into the details of the underground work, the products of the mine, the way it was [1030] worked and the expenses of working, and the general nature of the deposits, including as much as possible a study of the wall rocks and vein deposition. During that work, I came to Montana in 1880, and as the appropriation ceased for several months, I went to work day's pay, in the Alice mine. When the appropriation was resumed, I went back and finished up the year of 1880 and the spring of 1881, making examinations for the Census Department. That work ceased in February, 1881, I think, and for several months I drove a tunnel that I took by contract. In the spring of 1881, after that I went to Laporte, California, as superintendent of a drift gravel mine. In December, 1884, I returned to Butte, and occupied the position of assistant superintendent of the Bluebird mine for about six months and then went to Hong Kong, China, as consulting engineer for a Chinese mining company; continued there in that capacity one year. I then returned to the United States in ill health and resumed mining in the spring of 1887, as consulting engineer and mine superinten-

(Testimony of William B. Fisher.)

dent combined, for the present Senator Bourne, of Oregon. I remained with him for three years as an active mine superintendent in Oregon and Washington, and make expert examinations for him of various mines in those States, Idaho and California. I returned to Butte in 1890, and stayed here until the early part of 1893; during the greater part of that time I worked leases here on silver veins, and during the periods of financial depression, worked day's pay in the Parrot mine and in the Anaconda. I left here in the fall of 1893, went to the Slocan District in British Columbia, as superintendent of the Freddy Lee mine, which was a lead silver mine. I left there in the winter of 1894, and returned to Montana as superintendent of a development gold mine, eight miles south of Virginia City, the head of Alder Gulch. In the summer of 1895, I left there [1031] and went to Black Hawk, Colorado, as superintendent of the Perigo mine and mill, an active producing gold mine. Thence, in 1896, I went to Grass Valley, California, as general mine superintendent of the North Star Mining Company, which operated gold mines and mills. I had exclusive charge of the gold mining. In the spring of 1897, I took a position as superintendent of a gold mine and mill at Auburn, California, and operated it as a producing mine for two years. Thence, in October, 1899, I went to Joplin, Missouri, as general manager of the American Zinc, Lead and Smelting Company, and as such operated and superintended fourteen zinc and lead mines, each mine operating its own concentrator, and I had the

(Testimony of William B. Fisher.)

active supervision on the company's ground of forty other mines and concentrators, worked by leasers from us. In the spring of 1903, I became consulting engineer for J. B. Haggin of San Francisco, and as such examined and let leases on various properties belonging to the Haggin-Hearst and Tevis Estate, in Nevada, California and Arizona. In October, 1904, I went to Wallace, Idaho, as general mining superintendent for the Federal Mining and Smelting Company, and as such had exclusive care of their mines at Mullan, Burke, Wardner and various properties under development in the Coeur d'Alenes. Thence, in January, 1908, I went as general manager to Salt Lake City, and took charge of the Salt Lake Copper Company, and operated and superintended a copper mine in Utah, near Tacoma, Nevada. Last spring, I left their employ and entered that of the American Smelting and Refining Company, as consulting engineer, and, until October of last fall, examined mines in Missouri, Oklahoma, Tennessee, Kentucky, Virginia, North and South Carolina, and northern Alabama; in October, I became general manager of the Davis-Daly Company and came to Butte; during all the employment [1032] I have had as mine superintendent, or general manager, I have been frequently employed by my superior officers to make mine examinations in British Columbia, every state and territory west of the Missouri River and northern Mexico.

I did not examine the entire ground, as I understand it, that is in controversy, but examined several

(Testimony of William B. Fisher.)

shafts and tunnels, under the direction of certain engineers; the first one was about six weeks ago, the next two were last week; I have been there three times altogether. I examined shaft No. 21, a shaft about a hundred and ten feet deep, sunk mostly through wash or detritus or gravel, we will call it; the bottom of the shaft, below this gravel, is in what I should call decayed granite and fault material. The entire bottom of the shaft except for a little patch of granite in one corner, seemed to me to be in a fault, and the entire bottom occupied by fault material; the course of that fault was somewhat west of north and south of east, generally speaking, north and south; there was a slight dip easterly, I should figure perhaps eighty degrees from the horizontal; I saw nothing there that I could designate as a mineral vein.

I examined shaft No. 1, designated on Defendants' Exhibit No. 1; it seemed to be eighteen to twenty feet deep, sunk mostly through gravel. The bottom was in iron stained, decayed granite; by decayed granite I mean softer than granite would be if it had never been affected by the weather; there was no sign of a vein. I examined shaft No. 2; that shaft is about twenty feet deep, the greater part of it sunk through gravel; the bottom is in somewhat harder granite than in No. 1, but distinctly weathered, showing some iron stain in that shaft. There is a dyke of aplite, quite strong, from a foot to two feet wide, [1033] in my judgment; there was no vein. I examined shaft No. 9; it is in a dangerous condition below

(Testimony of William B. Fisher.)

thirty-five to forty feet, and I did not go deeper than that. That shaft is sunk mainly through gravel. Near the surface, about, as I remember it, twenty feet down, it enters decomposed granite, and there is a cross-cut runs northerly and there has been some lagging taken out on the east side. In that cross-cut, there are two slips, dipping about eighty-five degrees south. These slips are very narrow. There has been some movement, making a little clay in them, and that clay, and in the immediately adjacent granite, is stained green, probably from chrysocolla. Back of the lagging, I examined the soft granite very carefully and saw no sign of a vein, and I saw no sign of a vein in the shaft itself, but in the northwest corner of the shaft, in the westerly end, down about two sets below this cross-cut, there is a northerly and southerly slip, which I take to be one of the platings or slips that run parallel and compose a part of what is called the continental fault; that is all I saw in that shaft; the length of the shaft is east and west, and therefore the east wall of the shaft would be exposed at the east end, that is exposed under the lagging where it has been taken out; I should say an area covering five by six feet of the wall of the shaft can be seen there.

I examined tunnel 31; the tunnel is driven in a northeasterly direction, about eighty feet through wash; in the bottom, at about eighty feet from its entrance, more or less weathered and decomposed granite comes in, and gradually rises so that the tunnel at about ninety feet, I should judge,—I did not

(Testimony of William B. Fisher.)

measure,—is entirely in more or less weathered granite; about ten feet after it is in the solid granite, two cross-cuts [1034] have been driven, one northerly, one southerly. In the northerly cross-cut, about twenty or twenty-five feet in, there is a small mineral vein from six inches to a foot wide, as I remember it. It is well defined, has clearly defined walls, and more or less mineralized, if one may judge by the color and appearance of the mineral in it, with copper-bearing minerals. Its general course is easterly and westerly. That was all that showed during my first visit; my second visit showed more, because that cross-cut had been extended from four to six feet, and a similar small mineral vein had been cut. As I remember it, it was about six inches wide, with the same characteristics as the first one; going back to the cross-cut to the south, I examined it carefully, looking for mineral or veins, and saw none; there is a little mineral stain in there, a considerable oxidation of the granite, giving red stains where the mica and any iron that might have been in the granite, in any form, is oxidized. Leaving that, and going further into the tunnel in a northeasterly direction, a vein is shown on the left-hand side of the tunnel; it appears to me to be from eight inches to one foot wide; has well-defined walls; is mineralized with what appears to be copper-bearing minerals; I think it is the same vein that is shown in the northerly cross-cut, where it is first encountered; this vein that shows on the left wall of the tunnel last referred to, after going along the wall for perhaps twenty odd feet, is

(Testimony of William B. Fisher.)

abruptly cut off by a fault plane, and beyond that fault plane, there only appears, for several feet, more or less iron stain and decomposed granite. Then there is another fault plane, northerly and southerly, like the first one and apparently parallel to it. Beyond that fault plane, the tunnel continued in decomposed granite, more or less iron [1035] stained, and about ten feet beyond that last fault plane, there is a patch of green-stained rock, which, when plotted on the map, seems to be in line with the small vein seen in the northerly cross-cut, and with the small vein seen along the left wall of that tunnel. There is not sufficient work done to determine whether it is a true mineral vein or a mere area, copper stained. Beyond that green stained place, there is a very short cross-cut, or small cut, made into the left wall of the tunnel, and it does not show any appearance of having a vein in it. This is possibly due to a fault plane which crosses just where this little cut is made. The fault plane runs northwesterly and southeasterly. Opposite this last small cut, opposite this last small green appearance there is a cross-cut driven southerly; in this cross-cut, there are at least two small slips, but no appearance of a mineral vein, nothing but iron stain and more or less weathered granite; my memory is that the dip of the fault near the face of the tunnel is slightly easterly.

I examined tunnel No. 34, the Mullins tunnel, and I examined some of the openings in connection with it; that tunnel is driven in a general easterly direction, through wash and gravel, for about eighty feet,

(Testimony of William B. Fisher.)

when the bedrock of granite is encountered in the bottom, and gradually rises as the tunnel is driven farther in. Just as that is encountered, on the left-hand side, a mineral vein appears; the tunnel has been driven ahead, I should estimate, a hundred and twenty feet or so, in more or less weathered granite. For the entire length, the mineral vein before referred to, can be seen, except where covered by timbers and I believe this to be continuous from the place it is first encountered to the end of the tunnel. That vein is apparently [1036] from one to four feet wide, has well-defined walls, and dips southerly at quite a steep angle. The vein is faulted at about twenty-five to thirty feet after it is encountered, going in the tunnel, by two fault planes or slips having a general northerly and southerly direction, and which seemed to me to be a part of the great continental fault. The vein is thrown slightly south between these two fault slips. Beyond them, about thirty feet or so, a winze has been sunk on the vein, and it can be seen that stoping has been done above the tunnel along there, and evidently some valuable ore taken out. As it does not now lie on the dump, it must have been removed. The vein continues from the winze between well-defined walls, easterly about twenty to thirty feet, where it is cut by a fault slip or plane, which does not throw it materially as it continues to the face of the tunnel. I should say the amount of the discoloration between the two fault planes I mentioned is about one foot. At the point of dislocation of the vein in the Mullins tunnel, a

(Testimony of William B. Fisher.)

cross-cut has been driven southerly, and after going in ten or fifteen feet, seems to have intersected the bottom of the discovery shaft, which, on the map, I note is called the Gulf discovery. This is sunk largely through wash or gravel, but enters the decomposed granite just above, apparently, the back of this cross-cut. Going farther along this same cross-cut, in a southerly direction, a shaft is encountered that is marked on the map given me, Hornet Discovery, and the same cross-cut was apparently driven beyond the Hornet shaft, but I did not enter it where it went beyond the Hornet shaft. In this cross-cut, along the fault plane, there is heavy green staining, and in the fault matter, near the vein, there seems to be a little of the same sort of copper mineral that occurred [1037] in the vein; I should judge it to be chrysocolla. The more easterly of the fault fissure can be traced to where there is a bend made in the wall of the cross-cut, at the southerly edge of the Gulf discovery shaft. I examined the decomposed granite or weathered granite, through which this cross-cut was driven, with great care, beginning at the hanging-wall of the Mullins vein. This granite showed bunches, kidneys and seams of copper ore in the form of mostly chrysocolla, occasionally cuprite. These bunches and seams and kidneys are scattered. They do not lie along any distinct line or in any vein. They could not be treated commercially, unless in very much larger quantities than what they exist there; I should say at least one thousand times. By commercial I mean no sane man

(Testimony of William B. Fisher.)

would attempt to mine and sell with an idea of making a profit of any such bunches, kidneys and stringers of ore as exist in the cross-cut from the Mullins vein to the Hornet shaft. I then went down the Hornet shaft and found another cross-cut to exist, going over to the Mullins vein. In this cross-cut, there are similar bunches, kidneys, mineralized seams or stringers, stained with copper, and in one or two instances sufficient copper mineral being present to call them bunches of ore. There was one that was noticeable. It might have been as large as a goose egg, and was mainly filled with very pure and beautiful cuprite, or oxide of copper. A solid piece of cuprite had evidently been carefully removed from this bunch. From the bottom of the Hornet discovery shaft to the intersection with the Mullins vein, I could not see any signs of any vein, outside the Mullins vein. I did not climb up the Hornet shaft above the upper cross-cut, but looked carefully at all the decomposed granite in which that shaft is sunk. I saw nothing but more or less iron-stained granite, [1038] some intrusions of small dykes of aplite and some places in the granite that were more or less stained with chrysocolla. I examined a tunnel that on the map supplied me is No. 37, the mouth of which is somewhat farther west than the mouth of the Mullins tunnel, or No. 34, but which is driven through the wash or gravel in a general easterly direction, practically parallel with the Mullins tunnel, and which, about eighty feet in, strike bedrock, which is weathered granite and somewhat iron stained.

(Testimony of William B. Fisher.)

After striking the granite, the tunnel is driven ahead sufficiently to end up finally all in weathered granite, as I remember it. But from the appearance of the granite at that point, I should infer that the back of the tunnel was exactly on the line of demarkation, at its highest point, between decomposed granite and wash. Everywhere else in this tunnel, including a short cross-cut going north from near the end of the tunnel, shows wash in the back. About ten feet back from the face, I went through a cross-cut that was driven northerly and intersected with a small raise, which I found out by further examination of the Mullins tunnel breaks through into the bottom of the Mullins tunnel, where it is driven in the wash. In the granite disclosed in the bottom of the face of the tunnel and the short cross-cut to the north, and in this entire cross-cut to the north that connects with the Mullins vein, there is considerable iron stain and some small aplite intrusions. My memory is that that raise connected merely with the Mullins tunnel.

I examined tunnel No. 36 and found it to be driven through the wash or gravel for a distance that I did not measure, but which I should estimate was eighty to one hundred feet; where it enters the weathered granite, two cross-cuts have been driven, a short one north and one perhaps twenty feet or about [1039] that, southeasterly. These cross-cuts, as I remember them, are mainly decomposed granite, quite heavily iron stained. I should say the upper part was in wash or very much decomposed granite, making apparently wash or gravel. In neither of these

(Testimony of William B. Fisher.)

cross-cuts was there any sign of a vein. Going on easterly in the tunnel from the point where these cross-cuts turn off, the tunnel enters entirely into granite and is cut by three fault slips, or platings, having a general northerly and southerly direction, and which I take to be portions of the continental fault. Between these fault slips, a cross-cut, about twenty-four feet is driven northerly. In this cross-cut, and throughout all the granite exposed in this working, there are a good many intrusions of iron stained aplite, but nowhere did I see any sign of a mineral vein.

I examined tunnel 35 and found it to be driven in a general easterly direction, to be about a hundred and fifteen feet long and having a very short cross-cut to the north, near its face. This tunnel is driven, throughout the entire distance, partly in granite along the bottom and partly in wash along the top. I should like to correct that testimony to this extent. I did not mean to state that the entire length of the tunnel was partly in granite and partly in wash or gravel. I should have stated that those were the conditions of the face. In the face, there is decomposed granite and aplite, all more or less iron stained. I saw no signs of a mineral vein.

I went down shaft No. 19, and should estimate it to be close to ninety feet deep. It is sunk about eighty feet through wash or gravel. It apparently enters bedrock at about eighty feet and now shows five to six feet of decomposed granite and clay. The clay existing along two fault planes, or [1040] slips, run-

(Testimony of William B. Fisher.)

ning northerly and southerly. I wish to state that the bottom of this shaft is now full of decomposed granite and clay and other material of that sort that has evidently caved in, or been pulled down beneath the timbers, and therefore the bottom, on the last time I was there, cannot be seen. These two slips, running northerly and southerly, have an east dip sufficiently flat to be plainly noticeable,—that is, they are far from vertical, and I should estimate their dip to be about fifty degrees from the horizontal,—easterly; these slips are larger and more marked than any other fault slips that I saw during my examination there, and should be inclined to consider them two separate faults or slips, probably part of the great continental fault. The material between them is very much disintegrated, iron stained granite. There is no sign there of a mineral vein. That concludes the examination of everything I made out there. My definition of a mineral vein is that a mineral vein is a fissure, or crack, in the rock crust of the earth, with reasonably definite boundaries, within which there have been deposited metalliferous minerals or metals, in sufficient quantity to justify exploration for commercial ore.

Cross-examination.

(By General NOLAN.)

The WITNESS.—I am fifty-three years and eight months old; my first position in which I had the title of superintendent was taken in June, 1881, and as I was born in 1858 that would make me twenty-three years old. If I said I was a superintendent in 1879

(Testimony of William B. Fisher.)

I made a mistake; I was in the Massachusetts Institute of Technology until March, 1879; I went to Leadville in March, [1041] 1879, but that was not after I graduated, because I did not state I graduated from the Massachusetts Institute of Technology; I did not graduate, and did not go through any examination there for the purpose of graduating; I did not attempt to graduate because I had become, owing to ill health, what they call a special student; at that time one who specializes in the studies that will become, in later life, immediately necessary in his profession, leaving out studies that are for general education, or one which may not be immediately necessary. I did not get a degree of any kind, and I did not graduate as a mining engineer; they told me that if I should return there and take and pass those examinations that I did not take and pass, which are incident to the course in mining engineering, that I would be given my degree as a mining engineer; I did not get a degree because I did not try for it, because I was hard up at the time, and I knew very high wages were obtainable in Leadville, and I had a mother on my hands that I was obliged to support; I estimated it would require at least six months more to fulfill the further requirements; I was lacking in sufficient lines to entitle me to the degree at that time, but not along others; I was lacking in the possession of knowledge sufficient to entitle me to a degree. I went to Leadville in 1879 and worked underground there, as a mucker and later as a miner; in 1880 I entered the employ of the government, for the

(Testimony of William B. Fisher.)

purpose of collecting some data in connection with the taking of the 1880 census; I came here early in 1880; the work I did by reason of my employment by the government made it necessary for me to examine mineral deposits and study wall rocks and vein depositions, and that kind of thing; I did some of that work in Colorado before coming to Butte; one of the [1042] government's requirements was that wherever possible, we would go into any cross-cut or workings that extended outside of what was recognized as the walls of the vein, that we examined, and we were to take from such workings a specimen four by five, solid, trimmed to a certain shape with a hammer, and mail it to Washington immediately. The examinations we were to make were on such points as to chemical nature and the ore, whether a sulphide or an oxide or a carbonate, the physical nature of the ore, whether it was soft or hard; whenever the vein material was hard enough to stand shipment we were required to send samples; I found many instances where the ore in the veins was hard enough to take a similar sample to such as was taken of the wall rock and mailed; there were many other persons besides myself making these examinations; I have no memory whatsoever of the entire number of samples I sent. The appropriation ceased sometime in 1880, and there was a suspension of this work and I went back to work in a mine here, and upon a renewal of the appropriation in 1881 I again resumed the work that had been suspended. My work for the Government ceased in the spring of 1881,—

(Testimony of William B. Fisher.)

my examinations ceased in March, 1881, and I did some work here in driving a tunnel by contract from the surface into a hill for mining purposes, in Leadville; I was not consulted about the strike or lead in the tunnel, and my judgment was not asked about it. In Laporte, California, I got my first job as superintendent, drift gravel mining, which was what we generally designate as placer mining,—the gold was placer mining; there was a tunnel run from the surface, and the tunnel after being driven through the solid bedrock of slate, intersected several hundred feet in from the surface and several hundred feet below the surface, an old river channel, [1043] filled with gravel which had been covered and made to appear to be in a solid mountain of rock, by an ancient overflow of eruptive rock, commonly called in that district lava. I initiated those operations, and exhausted the supply; the operations of the mine, from the time I took hold to the time I left showed a small profit, not sufficient to pay for the mine; I remained there as superintendent from the first day of June, 1881, to the last day of December, 1881, and from that time to 1884 when I returned to Butte I had nothing to do with mining, during which time I attended, as any man of small capital can, to his own business of investment and so on. In 1884 I returned to Butte and became assistant superintendent of the Bluebird mine, and I was there for about six months; there were no dividends paid during the time I superintended operations; I quit because I located an adjoining claim and got Jim Murray to

(Testimony of William B. Fisher.)

fight it for me and made them so much trouble that they suggested I resign; you will find that claim on the map as to Azor; the present representatives of the Van Zandt estate have told me that from the end of the Azor claim they took out about eighty thousand dollars of silver ore; it is not operated now; they did not tell me whether that exhausted the supply; no part of the Bluebird has been worked for a number of years; the gravel mine in California has been worked since I left, but not at a profit. Then I went to Hong Kong and was consulting engineer for a Chinese mining company for a year, but did not actively superintend the operations; the mining operations there were upon quarrying of bedded sandstones, carrying ruby silver in bunches; that was a very successful venture; I left because the doctors told me I should die if I stayed sixty days longer; there was virgin ground penetrated there as the result of my advice, but it was a part [1044] and parcel of the territory that they were working; and as a consulting engineer, the problem arose frequently as to whether it was to go through that territory or refrain from going through it, and it was my judgment that was persuasive in having the operations carried on as they were, when I saw fit to give an order that they should be; I was head man as consulting engineer; I think the superintendent there considered himself an engineer, who had charge, and we consulted together. I was in China for one year, and when I got back it took me between eighteen and twenty months to recuperate, and I resumed opera-

(Testimony of William B. Fisher.)

tions again in 1887, and I was then employed as a consulting engineer and mine superintendent in Oregon and Washington, for Senator Bourne, and I remained with him for three years; he had already bought the mines when I went there; I was active superintendent of a placer mine, without any name that I know of, in Josephine County, Oregon, between Grants Pass and Gold Hill; they made a little money while I was there; I lost track of it because he sent me to another place; he did not make any purchase of any property by reason of any reports I made; I think he backed my judgment but once and that time he won; it was in the sale of a property—I told him to get out; I voluntarily resigned from his service; he kept right on, so far as I know, in the mining business to the present date.

I returned to Butte in 1890, and worked some leases on the silver veins; I bought into the leases and worked myself, which was not a financial success after silver fell below eighty cents; I had to go to work as a common miner several times from 1890 to 1893; after this financial depression occurred I went to work in the Anaconda mine as a miner, and worked there about a month, and then laid off a week or two and went to work in the Parrot under Ben Tibby, as a miner, and then [1045] I became superintendent of a mine at Slocum, British Columbia, of the Freddy Lee, a lead silver mine, and remained there until the winter of 1894 as superintendent, and dividends were paid during all the time I was there except the last month; that mine was in active oper-

(Testimony of William B. Fisher.)

ation at the time I assumed the superintendency, and had paid about the same dividends that I made it pay; it stopped paying dividends for a while during the time I was superintendent. I returned to Montana in the winter of 1894, and became superintendent of a mining company in Alder Gulch, quartz mining, which was absolutely a prospect; I quit there because the men who were putting up for it got tired; I advised them to quit; there was evidence of mineralization there,—a mineral vein; the indications on the surface were such as to justify exploitation for commercial ore, and we found commercial ore for some distance down, and it became too poor to pay; I could not tell that before I mined it. Sometimes where you find commercial ore at the surface, at greater depth the vein becomes barren, and if you have a mineral vein at the surface, it may become mineralized in depth so as to furnish commercial ore. I do not understand by a mineralized vein that there must be enough mineral at the surface to pay the expense of working; there must be mineralization to justify a man in thinking that he will find commercial ore; I have never heard the amount necessarily legally defined. In the light of my experience, I should not usually start developing a mineral vein that did not show some profitable commercial ore right from the turn loose. After getting through in Alder Gulch I went to Black Hawk, Colorado, as superintendent of the Perigo mine, as I remember it, and mill,—they owned their own mill, and at that time that was an active, producing [1046-1047]

(Testimony of William B. Fisher.)

gold mine in a small way, and the output increased while I was superintendent, and it was producing gold profitably at the time I left; I left because I married and preferred to live elsewhere, and was independent in means. In 1896 I went to California as superintendent of the North Star Mining Company, which operated gold mines and mills, and I had exclusive charge of the gold mines, and I remained with that company one year, and left voluntarily; their operations were extremely successful during the year I was with them. Then I went to Auburn, California, and took charge of a gold mine and mill there and operated it for two years, and left there voluntarily. I went from there to Joplin, Missouri, and became general manager of the Zinc, Lead and Smelting Company, and had the superintendence of a number of mines, and mines operated through leasing,—about forty of them, and I remained there a little over three years, and left voluntarily; my operations were remarkably successful, and the mines were operated after I left. After getting through in Joplin, Missouri, I entered the employ of Haggin, and had supervision of leases, letting leases on various properties, and also the examination of properties, belonging to the Hearst and Haggin and Tevis outfit, in California, Nevada and Arizona; I was moving around from one place to the other, as I was directed to examine properties; I continued in that for one year, and then I resigned. Then I went to Wallace, Idaho, and there became general mining superintendent of the Federal Min-

(Testimony of William B. Fisher.)

ing and Smelting Company; I have forgotten the exact month in 1904 I went there, but I terminated my engagement January 31, 1907; I was general superintendent of the mines, not of the mills. In January, 1908, I became general manager and superintendent of the Salt Lake Copper Company, and continued in the employment of that concern until [1048] May 15 last, to enter the employ of the American Smelting and Refining Company, and I continued with that concern until October, when I became general manager of the Davis-Daly property here in Butte. I was also in Oklahoma examining mining properties, but not copper properties; in Salt Lake it was a copper property I was with. I do not believe the directors of the Davis-Daly property will declare a dividend just yet. I was up here one of the days Mr. Winchell testified, simply because I enjoy hearing him testify, which was the purpose that prompted me in coming, and I always gain some knowledge and information from it. Mr. Berrien called my attention to the point where I made the examination of this property in controversy, and also by Mr. Linforth; I examined it a second and third time also; to get more clear ideas, if possible. The word fissure is frequently used in mining. A slip, in my judgment, is a narrow, rather limited crack along which there has been a certain amount of movement,—the rock has slipped, one part upon the other, somewhat; there cannot be a slip unless there is a breaking of some kind; my idea of a fault is a very large slip; a slip in concealed por-

(Testimony of William B. Fisher.)

tions may assume a magnitude so that it may be a fault. In my conception, the difference between a fissure, or a fault or slip, is that there has been no movement, necessarily, in the fissure; there always has been some movement in a fault or a slip; I think you have movement in case of a vein; I think there is some movement in most veins and faults. A fissure is a break or crack in the rock, where there has been some extensive movement,—extensive enough to recognize it; I do not classify the mineral veins of Butte as pure fissures; they have become veins; they might have been fissures at first, but they have become veins; my experience in Butte has shown me the vein material in the ore [1049] bearing veins to be crushed and highly altered country rock, mineralized with metalliferous minerals; the country rock in Butte is principally granite, in the part of Butte with which I am most familiar with, and in some instances there may be interjected in some way into the granite, aplite or porphyry; it is there. Speaking about the fissure itself, the filling of the crack is generally very highly altered country rock adjacent to the crack, and if the crack goes through a body of aplite, you are likely to find the vein material highly altered aplite, and if the vein goes through granite you will find it highly altered granite, and speaking about this highly altered material, you simply have the country rock subjected to some changes, where its original texture suffers modification; in the case of a fault, the filling is merely altered in its physical appearance; it is not altered

(Testimony of William B. Fisher.)

material in its chemical composition, as it is in mineral veins; in the case of the fault or slip, by reason of the movement, it is the same material that has always been there, but ground to a state of exceeding fineness; you find gouge in mineral veins, just the same as you do in fault fissures, and the same as in slips, but in much greater quantity; in what I consider a fault the alteration is almost entirely physical; there is very little mineralization from any source outside the immediate neighborhood of the fault; if I saw material so mineralized as to change the original texture of the material, chemically changed and enriched so as to make it commercial ore, I should consider it no longer properly described by the term fault fissure; I should consider it a mineral vein; if it was sufficiently mineralized with metalliferous minerals to make it reasonable to pursue its exploration in the hope of finding commercial ore, I should [1050] consider it a commercial vein, properly termed, and I should say that if it ceases to be a slip when the conditions you have just enumerated, commercial ore there, and sufficient quantities, it would become a mineralized vein; I think any crack or fissure in the rock,—the crust of the earth,—that has become sufficiently mineralized with metalliferous minerals to justify the search there in the hope of finding commercial ore,—I think that can properly be termed a mineral vein, and whether it runs east and west or north and south does not affect a vein; my definition of a mineral vein was that it was a crack or fissure in the rock crust of the earth,

(Testimony of William B. Fisher.)

with reasonably definite boundaries, within which there had been deposited metalliferous minerals or metals in sufficient quantity to justify exploration for commercial ore. I had in mind when I spoke of veins other than mineral veins, pure silica, oxide of silicon, commonly called quartz, that exists in many countries which contain no metal whatsoever; I would not insist that this vein filling, containing the mineralization, should be quartz. In tunnel No. 31 I found two veins, and one vein in the Mullins tunnel; I think it is an even chance whether those two veins in the cross-cut of tunnel 31 would come together or not; there was not enough work done to form an intelligible opinion; if they dipped toward each other, they would certainly come together at some depth; in my examination there I did not have my attention directed particularly to that feature for those two leads, as to the likelihood of their coming together by depth; I have known of instances of veins situated like those coming together. In the case of a vein itself and a mineralized material within the walls, it is not all mineralized alike; the mineralization is manifested to me by the general appearance, into which comes [1051] color, shape, and weight, and there are sometimes, in the lead matter itself or striations, and as you go along this fissure, mineralized, there is a changing occurring all the time in the value of the material; I have never been able to find anything that will tell me whether or not a mineralized vein is going to get richer or leaner in depth; there is nothing to enable me to say

(Testimony of William B. Fisher.)

whether the lead will widen out or grow less in depth, for any great extent; of course, as far as I can see, I can see whether the walls show together or apart; I cannot tell anything about the dimensions a foot beyond where I see it. I think the lead in the north cross-cut was a well-defined lead, I could not call it a typical Butte mineral vein, one reason was that all the Butte veins I have been fortunate enough to have anything to do with, are very much larger and in the matter of mineralization the Butte veins that I have seen are principally mineralized with sulphides of the metals. This vein out there did not, to my naked eye, show anything that I could say was sulphide; I saw mostly chrysocolla; it was silicate. I was in the oxidized zone in this cross-cut; I do not know of any veins in Butte where the sulphides are reached so near the surface; I have encountered instances outside of Butte where the sulphides come to the surface of the ground; I would not expect the sulphides so near the surface in this camp. I certainly would designate the lead or vein in that cross-cut as a mineral vein. Immediately south of the footwall of that first vein, my memory of it is that the granite wall of that vein was slightly stained with chrysocolla; I did not notice any cuprite beyond the limits of the mineral vein. The country rock between vein No. 1 and vein No. 2 appeared to me somewhat more decomposed than the granite composing what I [1052] consider the wall rock; there is such a thing as granite being altered by weathering,—it may be

(Testimony of William B. Fisher.)

chemical in its course, but in its result it appears as a physical alteration; if the altered material is there, I can define it without defining how it was accomplished. I call exhibit 40 a piece of waste, —I do not know what it was originally; if I found a fissure of that a foot or two wide I would not locate it. I have located copper claims, but not in Butte; my judgment about that piece, without making a proper test on it, as a good mine superintendent would, is this: that if I came across that material in a vein that I was operating a mine for the purpose of making money, I should put that in the waste heap until I had it assayed. Exhibit 58 looks a hair breadth better; I would not locate a fissure with walls and containing material only showing iron oxide, until I tested it for gold; I might locate it if there was gold there, if I thought it was the gossan of a copper lode; when I speak of mineral vein I have in mind this replacement as to mineralization, sufficiently valuable to, in a measure, meet the expenses of operating. If I found material like Defendants' Exhibit 66, you bet I would locate it and prosecute work, because it is very largely made up of cuprite, and has the value, and enough of it will furnish a revenue to carry on operations; I saw no pieces as good as that in the cross-cut north from tunnel 31. In the first vein, and between the walls, I found material sufficiently mineralized to make one feel that that was a place one might hope to find commercial ore by further exploration. There was nothing to suggest to me that the veins terminated

(Testimony of William B. Fisher.)

in their course westerly, represented on Complainant's Exhibit 17; I think it probably went a little farther than I could see it; with so many faults as there are [1053] crossing that country, I would not be willing to bet it would go over ten feet; the vein presumably was there before the fault occurred.

I never personally have seen the largest of those faults that, taken together, are called the continental fault, but I have heard it described by various mining men in Butte; there are a number of parallel faults, but I don't know how many, or their size; there may be a fault immediately west, within ten feet, and it might be that this vein ten feet from there might open out to a bonanza; it might carry any quantity of this cuprite, perfectly conceivable. I think this lead exposed in the tunnel is a continuation of the first lead I encountered, because I believe that the second exposure of a vein on the north side of tunnel No. 31 is probably the extension of the exposure in the cross-cut, because it has practically the same general strike. The appearance of the vein is very nearly the same; I could not find, in the bedrock between the appearance of the vein in the cross-cut and its appearance on the left-hand side of the tunnel, going easterly, any fault that would have been likely to cut it off and become another vein, and therefore I say it is probably the same vein; at a point on the left-hand side, going easterly in tunnel 31, just where a very short cross-cut or hole has been blasted out of that left-hand side, there is a green discoloration, somewhat resembling in appearance the vein back of this main fault, and

(Testimony of William B. Fisher.)

the vein in the first cross-cut north, but not sufficient in quantity or sufficient development work done to form an intelligent opinion upon it; there is a possibility that that exposure near the face of the tunnel was a lead in its course east and west that I encounter in the tunnel and in the cross-cut; I have known of instances where a small vein with well-defined walls, showing [1054] iron oxide at the surface has, with depth, shown some valuable mineral. I have in mind the westerly opening in the northern portion of the ground, and west of this tunnel No. 31; we have a fault there, but I am not sure that there is what I designate a fissure there; there was a fissure there and it is now a fault; there has been movement since it was fissured, and this movement is made manifest by the condition of the material exposed in the opening; the quartz there is altered physically, but I am not enough of a mineralogist, or vein geologist, to say that it is altered chemically; there is quartz there; in my judgment it is very different from the quartz you find in a vein fissure, because it is the quartz that has come from disintegration of one of the rocks of which quartz is a constituent mineral and the quartz you find in veins is quite different in character, and presumably different in origin; there is quartz in that shaft which I think came from the ground up granite; the quartz in the vein that is mineralized, so far as I know, and what I have heard of the theories of geologists, it came largely from a rising water,—perhaps solutions would be a better term,—that would include vapors; in the mineralized veins of the Butte district,

(Testimony of William B. Fisher.)

there is a certain amount of quartz which has been altered very little or none from its condition in the granite; that kind of quartz you find in the bottom of this shaft 21. I call exhibit 96 decomposed rock, altered physically altered, but how much it is altered chemically I cannot tell without taking it to a chemist and having it determined; I could not tell whether that at one time was granite, or one of the family of porphyries, under the generic name of porphyries; sometimes you find material like that in vein filling; there is certainly some iron oxide there as a metallic [1055] mineral; there may be several others; I do not know of any instance where there could possibly be chemical action without physical action. Some of that material looks like the material in shaft 21, but I saw nothing exactly like that in place; that looks more like what I told you was loose in the bottom there. In my judgment the walls of this fault were not disclosed in the shaft; it appeared to me to strike slightly west of north, because there were fairly smooth planes of clay like material running in a northerly and southerly direction. If I can assume that Defendants' Exhibit 77 came from that locality, I would say it is much altered aplite, but I am not a mineralogist or vein geologist, and it would be simply an opinion of a very ordinary miner. I think that was altered from its original condition. If I had a large fissure containing that sort of material, and if the assay was sufficiently high to give me hope of finding commercial ore by following it, I should probably consider it sufficiently hopeful of value to do

(Testimony of William B. Fisher.)

something with it; if it only had iron oxide I would pass it up unless the assay showed something of good value; there is very little quartz there; you may have quartz without a crystallization; I should say there was crystallization in the case of veins in at least half the times. I did not see anything like that in shaft No. 1, in place. If I saw material like that in shaft No. 1 I would have a somewhat different opinion of it. In that district I should call exhibit 57 that it was once aplite, and it has suffered a partial change; there is quartz in that,—the black stuff is presumably iron or manganese oxide; you find material like that in veins in this camp, but I did not find it in shaft No. 2; if it did come from there, or I saw it there, I would slightly revise my judgment as to the conditions of [1056] shaft No. 2; from the examination I made of shaft No. 2 I say there is a dyke of aplite in it with a very slight alteration; the extreme bottom of the shaft is in granite; the wash and gravel there are approximately, I should say fifteen to sixteen feet, in shaft No. 2 and in shaft No. 1 as I remember it, it was just about the same; my memory would say that you would encounter the bedrock ten feet under the surface. In shaft No. 9 I encountered what were fissures before the movement took place, and the width between the walls of these slips I should think was from a quarter of an inch to a half inch, possibly an inch; the material in these slips was stained green, and there was just enough clay there to indicate that there has been some movement; the slips were much nearer east and west than north and south in the

(Testimony of William B. Fisher.)

cross-cut; in the northwest corner of the shaft, in the westerly end of it, there is a slip, and there was a slight green stain in it here and there, down towards the bottom of the shaft, two sets below this cross-cut, but how far the bottom was I don't know; it did not look safe to go down there; I should say the cross-cut was about twenty-five feet from the surface. Replacement is the substitution of one mineral for another through chemical action, within the walls of a fissure as a rule; I do not know of any instance where this mineralization, in the case of copper mineralization, occurs outside of the walls of a fissure so as to form true boundaries for the vein other than the walls of the fissure itself, that would justify the use of new boundaries; I know of cases where there is copper mineralization outside the vein in the wall rock,—there is no bounding plane outside the walls, as a rule; I cannot recall seeing any mining in Butte done outside the walls of the vein, in any quantity; the only cases I have ever seen is where the amount was small; in that case I would take [1057] and ship it and get back inside the walls again, and in that place I would call the boundary of that material where the commercial ore ceases, and by commercial ore, I wish to add, I include quantity as well as quality; in commercial quantities as well as quality. In the Mullins vein I saw several instances of mineralization outside the walls of the fissure; it became ore in very small quantities; the greatest distance beyond the walls of the fissure that I noticed this ore in small quantities was the corner of that shaft,—the Hornet

(Testimony of William B. Fisher.)

Discovery; it did not cross the shaft in my judgment; I could not determine the original size of the shaft at the time it was sunk; this material is visible in the shaft where the shaft has slacked off in its connection with the cross-cut; this streak of ore is partly in the cross-cut and partly in the shaft at present; that is the only streak I should designate as ore; I saw some discolorations of granite elsewhere in the shaft; I called this ore principally because it contained enough cuprite to make it a distinctly copper material,—therefore it was a copper ore; this streak was on the extreme right-hand side, where that cross went into the Rabbit Discovery shaft,—I mean the Hornet, the right-hand side as you go south, and it extended northerly a short distance; I did no work to determine whether it terminated there; I should say it was very close to the bottom of the cross-cut, probably within a foot or eighteen inches, in the westerly wall of the cross-cut; I doubt if there was any dip, but if there was I should think it was about one per cent toward the north. I did not follow it up by removing the material upon it to see whether or not it terminated at the point where I say it did; I say it terminated there because I simply could not see any more of it; if it had gone through the hole into the cross-cut I could have seen it in the cross-cut.

[1058] The strike we were speaking of is now visible on one side of the Hornet Discovery shaft, near the west side of the shaft, near the bottom of the cross-cut, extending a short distance northerly; the west of the cross-cut is in solid rock, and nobody can

(Testimony of William B. Fisher.)

see it there, and as it is shown on the surface, it terminates on the surface a short distance north, but I cannot tell whether it extends farther to the north or not; I would call that a crack. I saw what I described as a kidney on the right-hand side of the cross-cut, going north, near the Gulf Discovery shaft; it went about four inches north, and it ended in a crack that went a little bit further; that is the kidney I saw in that cross-cut; I think the kidney like depression in the rock that now remains there was probably occupied by cuprite; somebody has apparently picked a greater part of it out; a person could find some cuprite in that cross-cut, but I do not think he could find there to-day as big a piece as there was there once; the intervals would be very long where he would find it and the cuprite very slight; the entire surface is not covered with chrysocolla; it only occurs here and there; there is very little altered granite there; it is softer than it would be probably at a depth of five hundred feet; the granite as it is there, the quartz and the feldspar and the mica are clearly discernible; I saw green stains in the Hornet shaft here and there, below the seam, in the granite; I should say it had a very slight alteration, and in the cross-cut extending from the bottom of the Hornet shaft in a northeasterly direction I found some of this cuprite, and here and there I found a little stain of chrysocolla; in this material outside of the walls of the fissure there is no commercial ore in quantity; there are one or two little bunches or kidneys, or little [1059] streaks, very small, that contain sufficiently

(Testimony of William B. Fisher.)

pure copper minerals to be commercial, if there was enough of them. I think exhibit 69 has a slight chemical and physical alteration, and I see what I think is mica in it; I would not call that ore without a very conclusive test; it is possible, but extremely improbable that that could be commercial ore; if the entire fissure was filled with material like that I do not think I should care to locate it; if it contained six or seven per cent copper and was wide enough, I would locate it; if it was a few inches and carried that much copper I would leave it alone. I do not know how this mineralization,—this chrysocolla, that I encountered here and there in these cross-cuts, and also the copper cuprite and also this kidney, came to be there in that country rock south of the Mullins vein, and I do not know how far that mineralization extends through the earth; I think the slips and the faults gave an opportunity for the mineralization. I do not think the Mullins fissure has anything to do with the mineralization that I encounter in the country rock from the Mullins vein to the Hornet Discovery. There are at least two fault planes passing through the country rock to the south of the fissure vein or the Mullins vein, and if this mineralizing agency coming up or going down through the Mullins fissure, and came to fault fissure, there would be an opportunity for the mineralizing fluid to get out there and travel a short distance, and it would get into the region of the country rock, but I do not think it would deposit this chrysocolla outside the fault slip; there is chrysocolla in several places in that cross-cut out-

(Testimony of William B. Fisher.)

side of the slip,—I don't know how it got there; I think the chrysocolla in that granite in that cross-cut came from waters that percolated down from the surface through tiny cracks, not [1060] visible to the naked eye; I think all of this mineralization there in the shaft was chrysocolla, outside of the walls of the fracture, and simply came from water descending into the earth, and I think the cuprite crystallized out of the same or similar solutions; that is, the same kind of a solution that formed the green colorings formed the cuprite; I think an aqueous solution coming from the surface, probably deposited the chrysocolla and the cuprite in the granite, outside the Mullins vein. I think there are two faults in shaft No. 19, two parallel faults separated by about four feet; I saw the footwall of one fault and the hanging-wall of the other, and they both had a strike west of north and east of south; I was not able to establish any connection between the two faults and the fault fissure that I encountered in 21; they are too far apart to form any intelligent judgment, to tell whether that fault fissure is the one encountered in 21 and 19, without much more work than has been done. The material lying between the two northerly and southerly faults in shaft 19, I should call disintegrated granite, considerably iron-stained; the material along the fault planes I should call clay, and there was the usual proportion of quartz lying between the faults; I did not see any extensive signs of alteration. Exhibit 100 is considerably altered physically; how much altered chemically I could not say; that looks

(Testimony of William B. Fisher.)

to me like considerably altered aplite; I saw nothing like that in shaft 19. I would revise my judgment somewhat, if, as a matter of fact, that material came from that shaft; I do not think that is altered granite; I think it is altered aplite; it is mineralized to the extent of having iron oxide at least; part of a mineral vein might contain that sort of material.

[1061] Redirect Examination.

(By Mr. SHELTON.)

The WITNESS.—If I found material like that in shaft 19, I should simply say that instead of the material between the fault slips being altered granite, that there was some altered aplite there; there is some material like that on the dump; a part of the bottom of the shaft was visible when I was there a few days ago. If I found material like Defendants' No. 57 in shaft No. 2, I should alter my opinion to this extent: instead of saying there was a dyke of somewhat altered aplite there, I would say there was some considerable altered aplite there, but I would not say there was a vein there, under the physical conditions in the bottom of that shaft; there were none of the physical evidences of a vein there; when I said there was no vein there, speaking of that shaft, I considered the three evidences of a mineral vein,—the physical condition, the evidences of mineralization with metalliferous metals, and the evidence or nonevidence of any commercial value of anything there; none of those three elements were present in shaft 19 or in shaft 1, or in tunnel 35; there was a slight evidence of one of those elements in tunnel 36, which was the

(Testimony of William B. Fisher.)

physical characteristic of cracks in the crust of the surface of the earth and some movement, running northerly and southerly; all three of those elements were present in what is called the Mullins vein, but no evidence of them in the cross-cut north from tunnel 37. If I saw material like Defendants' Exhibit 77 in shaft 1, I should alter my opinion to the extent of saying that there had been aplite there, and I should say that the aplite was considerably altered; I would not say there was a mineral vein there if I found such material as Defendants' Exhibit No. 77 in shaft 1, or anything having the elements that [1062] I named as the physical characteristic of a vein. If I found anything like Defendants' Exhibit 66 in fair quantities, I would say it would justify development. I could not see that little deposit of chrysocolla beyond the west side of the Hornet shaft; there was nothing that would indicate that that crack was extensive,—if it was I would expect it to appear on the west side of the shaft; I think there is very small probability of being able to trace that crack into the Mullins vein. 'On my cross-examination I was asked whether I would buy a mine or a location in which there was not commercial ore in sight, or to that effect, and I will say here that in answering it I made an answer that I should like whenever it is proper in this examination to make a correction, as I did not use one of the words there in its proper meaning.

I found the portion of my testimony I was speaking about at adjournment yesterday evening, on page

(Testimony of William B. Fisher.)

2912 of the transcript of yesterday's testimony. It begins: "When I was asked, "Now, is there any particular degree of mineralization at the surface necessary to justify that belief?" And I replied: "I have never heard the amount legally defined." And then I was asked: "Well, supposing that you started out yourself for the first time, would you designate any particular amount, in the light of your experience?" and I answered: "In the light of my experience I should not usually start developing a mineral vein that did not show some profitable commercial ore right from the turn loose." In giving that answer,— I wish now to testify that I was misled by the use of the word "yourself" in the last question of the cross-examiner, so that in replying I stated what I would do if I were working for myself with my own money. I soon realized, in thinking it over, that the cross-examiner [1063] meant me to understand, what would I do as an adviser of an employer under such circumstances. Understanding the question that way I now make reply that if, because the ground in question joined a very profitable mine which had good ore at depth, but did not necessarily show it at the surface, or if the surface indications, in the way of great amounts of gossan or other indications of metaliferous minerals were good, I should advise my employer to spend sufficient money, if he had it, to develop such ground at depth, in order to try to find such ore as was shown in the adjoining ground, or as might be reasonably supposed to exist under large masses of gossan or other surface indications com-

(Testimony of William B. Fisher.)

monly recognized as a pretty sure indication of valuable ore underneath them.

I found nothing south of what I consider the south wall of the Mullins vein that had the physical characteristics of a mineral vein. I found nothing there but country rock, showing irregularity, and occasionally small masses of ore, or the stain of copper mineral. I think the fault running south, which has affected the course of the Mullins vein, showed every evidence of having occurred subsequent to the formation of that mineral vein, and I think that fault, while it shows a little mineral in it and a considerable amount of stain, has none of the physical characteristics or other characteristics of a mineral vein.

Q. Where is the south wall of the Mullins vein?

A. The south wall of the Mullins vein, in my judgment—

By General NOLAN.—Object to that as repetition and not redirect examination; he testified to that in chief.

By Mr. SHELTON.—Yes, this is a repetition, but I want to ask another question and this repetition will make clearer the question I intend to ask.

[1064] A. —runs along the south side of the Mullins vein appearing as the hanging-wall, owing to the vein dipping south, and lies between the vein and the country rock or granite exposed in the cross-cut going to the Gulf and Hornet shafts.

By General NOLAN.—Move to strike out all of the answer of the witness except that portion of same

(Testimony of William B. Fisher.)

that is directly responsive to the question,—where he locates the wall about which he is testifying.

The WITNESS.—I think the hanging-wall and the south side of the Mullins vein is about correctly represented on the map, Complainant's Exhibit 15.

Q. Now, Mr. Fisher, what I ask you about now is the matter that I wish to inquire about particularly. State whether there appears to have been any mineralization of the country rock lying south of that hanging-wall, due to any deposit of mineral in the vein itself that you have designated as the Mullins vein.

A. I think the mineralization that occurs in the rock lying south of the hanging-wall of the Mullins vein is in no way due to the mineralization of the Mullins vein.

Q. Now, could you give your reasons for thinking that?

A. My reasons for thinking so is that I have learned by inquiry of the ore actually shipped from the Mullins vein that it showed some sulphide—

By General NOLAN.—Move to strike out the answer of the witness and also object to the answer of the witness for the reason that seemingly it is based upon hearsay evidence.

A. And I saw in the vein itself evidences of the oxidation of sulphide minerals, and I believe, from my knowledge of similar veins,—my experience here in Butte,—that that vein was filled originally, before oxidation took place, with sulphide minerals. [1065] I examined carefully the mineralization of the coun-

(Testimony of William B. Fisher.)

try rock or granite south of the Mullins vein, and I found only minerals that would be probably deposited, and, in my judgment, were deposited, from surface waters flowing downward.

From my experience in this district I know of my own knowledge of deposits of similar particles of chalcopyrite through the granite; the place I am most familiar with them is in the Davis-Daly mine, of which I am now general manager; we have many thousand feet of cross-cuts running through the granite country rock surrounding the vein that have been found in the Davis-Daly ground; a close examination of that granite in all the cross-cuts shows minute particles of chalcopyrite fairly evenly distributed through the granite; they are exceedingly small, but sometimes visible to the naked eye, and clearly seen with an ordinary magnifying glass; chalcopyrite is mainly sulphide of iron and some copper, the proportion of the metal copper being almost always very much less than the iron.

Q. Do you know what the effect of weathering is on such mineral?

A. As an expert mineralogist I could not say, never having made a study of such minerals other than the ordinary observation a mine superintendent would make, and my judgment is, under those circumstances, that—

By General NOLAN.—Just a moment. Object to the witness answering the question, for the reason that, confessedly, he shows his incompetency and lack of qualification to testify respecting the matter about

(Testimony of William B. Fisher.)
which he is testifying now.

A. And that the chalcopyrite when it oxidizes changes to sulphate of iron and sulphate of copper. Both of these we [1066] find are easily soluble, even in cold water, and, therefore, in the presence of water, it will pass away, in my judgment. There is usually left behind some oxide of iron, which, in the neighborhood of the rock where the chalcopyrite formerly existed is stained red, the ordinary stain of iron oxide. The rock is stained red; the red stain due to oxide of iron is found at different depths, surface waters containing more or less oxidizing material may penetrate.

I said on cross-examination that I did not receive a degree from the Massachusetts Institute of Technology; after severe illness in my third year, I became a special student, leaving out some of the studies prescribed for the course of mining engineering; at that time there was a regular course prescribed for the degree of mining engineer, and to receive a degree it was necessary to take all the studies prescribed in the course; I did not take the more advanced French and calculus. In cross-examination I said there had been a remarkable success in one or two instances under my superintendence,—I would cite the instance of the work I did for the Salt Lake Copper Company; that mine had been known and examined by prominent mining men, including Mr. Charles W. Goodale of this town, and turned down by them, as not likely to make a profitable mine; the people for whom I was working had come into pos-

(Testimony of William B. Fisher.)

session of it, and sent a graduated mining engineer there to run it, and he was unable to make any money out of it; he was discharged and I was sent there, and in the first twenty months I made a quarter of a million dollars for them; I consider that a very successful operation; and I can refer you to my record with the Federal Mining and Smelting Company, and the lead silver mines of the Coeur d'Alenes; when I took charge there I was given, by the [1067] general manager, absolute charge and full control of the Morning mine, which they had acquired within sixty days. I was told not to take—

By General NOLAN.—Object to that as hearsay and incompetent.

Q. If you can, tell what was accomplished without relating what was told to you.

A. Well, I meant I was given orders,—is that competent?

By General NOLAN.—Well, we will shut out the orders,—that is, if we can.

A. I was put in full charge of the three other operating mines of the company; in those two years the mining costs of the Morning mine were reduced thirty-eight cents per ton, on a tonnage of nine hundred tons per day. The costs on the three mines of which I did not have absolute and full control, increased about a like amount. I claim that I showed extraordinarily good ability as a superintendent, in accomplishing that, in the year 1896, when every mine in the country increased its mining costs, owing to the higher price of supplies and shorter hours of labor.

(Testimony of William B. Fisher.)

I was sent to Joplin in October, 1899, to take charge of the American Zinc, Lead and Smelting Company, which was then in charge of Ex-Governor Renfrew, a politician, but also a man who had dealt in and handled mining properties. The property of the company then was in debt about thirty thousand dollars, and in the preceding four months had made an average loss of a little over ten thousand dollars a month. I was given absolute charge of that property,—every power of the board of directors, except to sell real estate; I proceeded to improve mining, to improve the milling, to sell off property that I thought would not pay, and to generally carry on the mining business of that company as economically and as scientifically as possible. [1068] Within six months, the thirty thousand dollars of debt was paid off, and the company was paying expenses. It never again, during my administration, paid less than expenses, and during the succeeding two years and a half, earned on an average four thousand dollars a month, net profit; I consider that an excellent mining success.

I have several times examined properties, which the persons sent me to examine them, were inclined to buy. I have told them not to do so, and in all but one instance they followed my advice and saved a great deal of money. I consider that a mining success.

Q. And has there been any improvement in the affairs of the Davis-Daly Company since you have taken charge?

(Testimony of William B. Fisher.)

A. I think there has, very decidedly. The payroll is between ten and fifteen per cent less—

By General NOLAN.—We object to that as not redirect, absolutely immaterial, as encumbering this record with useless and immaterial evidence, having no bearing upon any of the issues in this case at all.

Mr. SHELTON.—It has a bearing on the weight to be given to the testimony of the witness, and it is proper redirect, on account of the character of the cross-examination.

By General NOLAN.—There might be some pertinency to this evidence, if, as a matter of fact, you elicited anything from this witness,—anything that tended to show knowledge as a mineralogist. As a matter of fact, any of this might be accomplished by slave driving,—all of this slaving,—all of this remarkable showing might be accomplished by the veriest ignoramus in mineralogy that ever lived. It absolutely has not anything at all to do with this case. It shows, as a matter of [1069] fact, that Mr. Fisher has his eye to business, so far as watching the expense account, but the expense account does not cut any figure at all in this controversy,—not a bit of it. Of course, if in the same witness, the fact was disclosed that he went in there and looked into some of those mines and, in the light of the information then given,—that there was barren ground,—and bringing into requisition his knowledge, he saw a lead in there,—that would have some pertinency,—but all of this evidence here simply has to do with looking after the dollar, reducing the expense account

(Testimony of William B. Fisher.)

in the operation of a mine. Now, I ask in all sincerity, what light does that shed upon this proposition here as to whether there are leads upon this ground.

A. In addition to reducing the number of men, I have so increased the quality and the tonnage of the output of ore, that the net returns are nearly double now, compared with what they were under my predecessors' management. This has been accomplished by mining ore, not wall rock, of which a great deal was sent to the smelter before.

I was never flat broke in my life and did not have to work as a day laborer unless I saw fit, but I was very glad to work as a day laborer to gain experience in mining. I have been discharged only once in my career, and the frequent changes I made before I was married in 1896, were due to my desire to travel extensively over mining countries and learn all the various kinds of mining that I could. I never voluntarily worked more than one year, before I was married, in one place.

I was discharged that time for the reason that the panic of 1897 very much reduced the financial abilities of Messrs. Guggenheim Brothers of New York; they discharged me, stating that it was owing to that fact.

[1070] By General NOLAN.—Move to strike that out as hearsay.

The WITNESS.—I can produce a letter to that effect by going to Salt Lake, and going to my safety deposit vault; their oldest and most experienced civil

(Testimony of William B. Fisher.)

engineer was discharged at the same time,—Gus Smith, and Mr. John Hays Hammond and Mr. A. Chester Beatty of New York, were discharged within ninety days of the time I was; there was a general reduction of the force at that time; two out of the four operative mines were closed at that time and all prospecting enterprise.

Recross-examination.

(By General NOLAN.)

The WITNESS.—I intended to graduate when I went to school until I had ill health, which is something of an honor; I never heard any person state that it was a reflection on one not to graduate; as a mining engineer I think it hurts a fellow's reputation moving around from place to place each year; since my marriage I have not moved around for the purpose of acquiring knowledge. I left Grass Valley after my marriage, because I got double the pay and became supreme boss by going to Auburn, about a year after my marriage; I was married in Berkeley, California. I left Colorado out of consideration for my wife; I left Grass Valley because I was offered double pay, and full charge of a mine at Auburn; I left Auburn because I worked that mine out,—and I worked it out profitably; I went then to Joplin, Missouri, because I was offered forty per cent more than I had got at Auburn, or was likely to get in California; I left Joplin because of my wife's death there, and because the doctors said on account of the climate my children were ill; I left Mr. [1071] Haggin's employ in San Francisco because, in my

(Testimony of William B. Fisher.)

employment, I had to constantly travel, and because I had married again and had two young daughters growing up, in charge of my second wife, and only saw them once a year,—and I thought it was a poor job for a man of independent means, who could do as he pleased. I left the Coeur d'Alenes in 1907 because I was discharged; and I left the Salt Lake Copper Company because the mine was worked out and they did not wish to employ me full time while cleaning up the dumps and old stopes by leasers; they suggested that I might go to the A. S. and R., which I immediately did; and I left the A. S. & R. because the present job was offered me through them, as a material advance in salary.

I am getting twenty-five dollars a day for testifying in this case; I commenced operations in this case sometime in December; I have served four half days and the time this morning, and have a claim of about fifty dollars.

In the case of the Salt Lake Copper Company I uncovered a few new bodies of ore that were unknown to exist,—uncovered through my initiative. The discovery of the ore bodies came about by following narrow streaks of good ore, through the mass of low-grade ore, to where it opened out into bunches of good ore; the deposit was mainly clay, an isolated body in limestone, having no vein formation whatsoever; the valuable ore existed in more or less irregular masses, from a few inches to twenty feet thick throughout this great body of clay-like material; the profit of approximately two hundred and

(Testimony of William B. Fisher.)

fifty thousand dollars that was made, consisted of about two hundred and twenty-five thousand dollars from the ore that I did not discover, and about twenty-five thousand dollars of the profit came from the ore that I did discover. I worked the property just as any [1072] leaser would follow up ore, no matter where it took you, and by following every streak of ore, big or little, I opened several new ore bodies. I think while driving through the ore mass,—there is no lead there, in that property,—there is a great mass, shaped like an apple dumpling about—and that mass was all mixed up ore and clay, and in driving through poor portions, following the discoloration of the clay, in narrower or broader streaks, perhaps the actual work for ten feet was not remunerative, but other work was going on at the same time that was highly remunerative, and it all went in together. In the case of the Federal Mining Company I uncovered one small chute that my employer, who was the only person I ever heard express an opinion, said he did not think existed; the showing I made there was by getting the goodwill of the men, so that they would be willing to work harder and still do good work, by changing the style of mining in stopes, by sorting the ore more thoroughly from the wall rock; by getting the goodwill of the men I mean treating them with absolute fairness, firing the poor ones, keeping the good ones, putting the oldest men in the easiest places, giving them good tools to work with, being very particular about safety appliances and seeing that they get good

(Testimony of William B. Fisher.)

board and that their bedrooms are frequently fumigated, to kill insects, and generally treating them like men. The ore shipped from the Davis-Daly since I became superintendent is ore that was exposed when I took hold; I have found no new ore bodies. I was here before I went with the Davis-Daly and was given full privilege as a mine superintendent, and went into the mine every day, and it was then I saw they were shipping more country rock than should be with the ore. If there is a mineral vein, in my judgment, the three [1073] conditions I mentioned must exist to a more or less extent. One of the physical characteristics of many mineral veins is a hard, quartzy outcrop, standing out more or less boldly from the surrounding rocks or earth. Another physical characteristic is the appearance of more or less decomposed rock, very different from the rock on each side in the immediate neighborhood. Another physical characteristic is a slight depression in the surface, going through a country where the surrounding rocks are harder than the veins. Another physical characteristic is the outflow of water from where you infer from the appearance the vein may be. If that vein water contains copper, it usually stains the neighboring rock, and is an evidence of a mineral vein. Another physical evidence is the actual physical vein being plainly in sight, and often ore sticking out plainly between two clearly defined walls, as in the case of the Freddy Lee mine in the Slocan country, in British Columbia, where silver lead ore, in the form of

(Testimony of William B. Fisher.)

galena, stuck out of the surrounding rocks as plainly as a curbstone shows between a brick sidewalk and an asphalt paved street; those are all the physical evidences I can immediately think of; this last characteristic is decidedly exceptional; I would like to add in the fact that the ore was unaltered at the surface; it is very common that gold-bearing veins stick out on the surface, showing valuable ore just as plainly shown between the surrounding wall rocks as a curbstone is between a sidewalk and the street pavement. I should say the outflowing of copper water from a vein in Butte was exceptional; I should certainly not expect to find mineralizing waters flowing out, uphill, through that wash in the ground in controversy; I was not on the ground in controversy when the surface was untouched, and I do not know [1074] whether the Mullins lead showed on the surface or not. I do not think I could see the silicious material there in place. Where there is heavy surface deposit or wash, or gravel, I think no portion of the vein would be visible; if a mineral vein is covered by deep wash, it seems to me impossible to see either vein, decomposed material, or walls from the surface until opened; where the deposit averages as deep as it does on the ground in controversy, I think it would be exceptional to find a silicious outcrop in place, poking up through it. Iron is a metalliferous mineral; if there is a sufficiently large amount of iron there to make it probable that it will become commercial valuable by exploration, I should call it a metalliferous vein, bearing iron. In the case

(Testimony of William B. Fisher.)

of metalliferous veins, not chiefly valuable for iron, sometimes you start out with simply evidences of iron; if there is a large amount of iron in certain physical forms, usually called gossan, I think it is a reasonable presumption in this country that it is possible to find other metalliferous metals by further exploration; finding material with iron oxide in the lead suggests that possibly there may be other metalliferous minerals there; if there is a large iron gossan on top of what is suggested to one as a mineral vein, and intermixed with that iron gossan, there is chalcopyrite, bornite, copper or chalcocite, I should say that there was ample evidence that further exploration would possibly prove the existence of a valuable deposit of metalliferous minerals. In my judgment, the mineralization that shows outside of the Mullins vein did not occur from ascending waters. I have heard of the Parrot vein, but I never saw it before it was covered with waste material and buildings. [1075] Ascending waters will impart green stains whenever there is the element carbon present, making it possible to form carbonates of copper, which are green and blue; there are cracks in the country rock to the south of the Mullins fissure; I think the only breaks that go through the fissure itself and also go into the granite are the fault slips there; I know that nearly all of the veins in Butte, that the hanging-walls are so fractured and broken, through faults, that they have to be timbered to keep them up, and those fractures and breaks existing, there is nothing to prevent the ascending solu-

(Testimony of William B. Fisher.)

tions from going there if they were made previous to the coming of the ascending solutions; I do not know when they were made; there is nothing to indicate in the Mullins vein that the fault fissures I have seen there were there before the ascending solutions.

(Signed by witness before examiner Feb. 17, 1912.)

[Testimony of Frank A. Linforth, for Plaintiff.]

[1076] FRANK A. LINFORTH, a witness duly sworn on behalf of the complainant, testified as follows:

Direct Examination.

(By Judge BOURQUIN.)

The WITNESS.—My name is Frank A. Linforth; my residence, Butte, Montana; my occupation is mining geologist and engineer; I attended the University of California in the Mining College; I entered in 1902 and graduated in 1906, with the degree of Bachelor of Science, and I have been following that profession since graduation; for six months previous to graduation and for six months after graduation, I had certain reports and examinations of the pyrite deposits in the Coast Range, in California, owned by the Pacific Coast Borax Company; also, during the same period, did geologic work in the vicinity of Grass Valley, California, underground and on the surface; those were gold mines at Grass Valley; in the pyrite mines at Leona Heights in the Coast Range; that was all I did previous to coming to Butte in February, 1907, and from that date until now I have been employed as assistant geologist for

(Testimony of Frank A. Linforth.)

the Anaconda Copper Company from that date until now; the routine duties in the office consist in the examination of the underground and surface exposures of all geologic conditions, then in platting the observations so taken upon maps prepared for that purpose in the office, and of deducing and arriving at the conclusions from such data for the purpose of further developing the mines; in addition to the routine work, I have frequently had to examine properties in the various parts of the State and in Nevada. The area assigned to me by the Anaconda Copper Company has for its westerly extension the workings of the Buffalo mine, and [1077] for its easterly extension the workings of the Right Bower mine; the northerly extension no limit has been placed, and for the southerly extension the south workings of the Diamond mine, which covers three or four square miles; that area is situated directly within the great copper producing section of Butte, and including a large portion of it. I have frequently examined many other places within the Butte district, and carried on this same work,—that is, the district to which I am assigned; my underground work has been the examination of the openings for the purpose of recording geologic data, and the recording in a note-book of the measured width of the veins, of their character, recorded in a note-book by a definite color scheme, which is used in the office, the recording of notes with reference to the character of the vein, the arriving at the definite boundaries of the veins so that

(Testimony of Frank A. Linforth.)

they may be platted on the map, for the direction of the operator.

I am acquainted with the district wherein lies the ground in controversy here, and have known it since the middle of October, 1911, and I had a slight familiarity with it prior to preparation for testifying in this case; my attention had been called to certain characteristics of that portion of the Butte district. The nearest producing mine in which I have actually been employed, is probably a distance of a mile from the ground in controversy. I have spent several full days in the examination of this property and portions of some other days, for the purposes of this trial, and I examined, as carefully as possible every opening on the ground; I did not examine the Rabbit discovery which I believe is not on the ground in controversy. I know where the line is in the Butte and Boston placer which divides that portion in controversy here from the portion not [1078] in controversy, and I examined the surface also of the ground in controversy. In connection with the surface, the chief observation is the deep accumulation of surface debris or wash, in which is found fragments of all of the material that composed the original solid mass of mountain there; that is, with relation to the surface. There are very decided evidences of erosion; it has been estimated that a thickness of five hundred feet has been eroded from the original surface of the ground there. An observable fact is that the country rock of that district is aplite and granite; that the aplite in proportion to the area is

(Testimony of Frank A. Linforth.)

greater than it is in the rest of the Butte district; that we have, heretofore, a greater total silica content for that district. As a matter of observation, we have, further, that the granite which occurs in that district has been stained in very large, irregular patches and at a great many places throughout the entire district, referring to the east side. The excess of silica in that vicinity extends to the ground in controversy, and the total larger quantity of silica renders logically the total less amount of iron. At many places directly on this ground in controversy and in adjoining areas large patches of green stained granite are observable; the depth of the green staining is too shallow, and the absolute indefiniteness of its boundaries is observable. It is distinctly observable in the cross-cut spoken of as the Gulf cross-cut, and in the Hornet shaft, although to a less quantity with depth. It is discernible in the lower cross-cut of the Hornet workings to a less quantity than in the upper cross-cut; it is observable only slightly in the workings of the Vesuvius, and very slightly in the short cross-cut from shaft No. 9. The presence of the staining is accounted for through [1079] chemical processes; to start from an observable fact, we have the greater proportion of aplite for a unit of area; this naturally gives rise to a less total content of iron; there is one other fact to start from, namely, that granite contains as an accessory mineral, the sulphide of iron and copper known as chalcopyrite. In the decay and rotting and erosion of this cut there, the oxidation processes have been very active, and the

(Testimony of Frank A. Linforth.)

sulphide has become its natural oxidation product, namely, sulphate. Copper and iron sulphates are extremely soluble. Cold water will make a solution of either of them. The copper sulphate coming in contact with silica, by a natural chemical transposition, gives you copper silicate. Copper silicate is chrysocolla, therefore the original of chrysocolla; now, as to its exact location in the granite, these facts are observable. The silica that entered into the combination in and near the ground in controversy came distinctly from the more silicious portions of the country rock,—principally the aplite. In the Mullins vein itself, we have a distinct vein mineralization; the staining is in less proportion. The mineralization of the vein itself has given rise to the chrysocolla in the vein. We have the granite there, altering by the oxidation processes, through a considerable depth, and the feldspars and the granite in any alteration process became kaolinized; the process of kaolinization, as can be seen in any specimen of granite in which that process has taken place, renders the feldspar a porous, more or less spongy material; the process of kaolinization also liberates silica, which silica is liberated and remains at the place where it was liberated. Now, the copper sulphate solutions, which have been produced by the oxidation of the sulphide ore, simply absorbed by this porous part of the [1080] granite, this kaolinized material, and while there in solution they are attacked by that silica present at that very point, and deposit the chrysocolla and copper silicate directly within

(Testimony of Frank A. Linforth.)

the pores of the feldspar, which is now kaolinized. The quartz has not suffered in this way, and the ferromagnesian minerals. The staining of the granite is almost entirely in the porous feldspars within the granite, and they were originally within the granite. The mineralization of the Mullins vein is from an entirely different and separate origin from the chrysocolla in the country rock south of it; the original mineralization of the Mullins vein probably preceded this staining of the country rock in the vicinity of the vein by a long period; the original mineralization of the Mullins vein—it has since suffered its oxidation, however, and in oxidation has added somewhat to the staining of the granite in the vicinity of the vein; in the staining of the granite I have reference to the green staining observed by the porous parts of the feldspars, the same that has been termed here chrysocolla. Cuprite occurred outside of the Mullins vein, in the small joint planes and cracks in the granite. As to its origin, we had in the first part of the theory which I outlined, a solution of copper sulphate derived from the oxidation of the copper sulphate; the copper sulphate solution coming into contact with silica, produces copper sulphate and some cuprite; the cuprite occurs as a result of a certain chemical balance, the silicate is deposited to a certain extent, in so far as the elements present allow the combinations that make copper silicate, and the balance goes into the precipitation of a simpler compound, namely copper oxide; another name for copper oxide is cuprite or melaconite. This chrysocolla

(Testimony of Frank A. Linforth.)

might originally have occurred in other parts [1081] of the district, but it could not have remained there; it must have been removed immediately. In stating the observable facts on the Butte and Boston placer district, we have an excess of silica, which originally gives no excess of iron; in the more productive part of the Butte district, that is not the case; there is some iron, in greater quantities than in the Butte and Boston placer district; now, the oxidation of the iron to iron sulphate immediately dissolves the chrysocolla out and carries it down into the veins; and it has the same effect upon cuprite. This has occurred in all cases where there is enough excess of iron to dissolve that silicate. This dissolving of the copper cuprite and its apparent disappearance has occurred at any place where there is an excess of iron to dissolve; it is possible that the chrysocolla redissolved because the solutions that did the dissolving were there at the same time; as to the effect on chrysocolla and cuprite in the copper producing section of the Butte district, the copper of the chrysocolla, going into solution, goes down the veins and produces the mineable copper ores in the lower levels, but the remaining material, the silicate, is what you see to-day in the outcrops of the Butte veins, namely, quartz and iron, and the same is true of cuprite, and in view of that result, there is almost no chrysocolla and cuprite apparent in the copper producing section of the Butte district; chrysocolla and cuprite is derived from peculiar conditions of the ground in controversy; it has not been dissolved like the chrysocolla and cup-

(Testimony of Frank A. Linforth.)

rite in the mining district because the iron and iron sulphate has not been in sufficient quantity to attend to that solution.

On Defendants' Exhibit 1, shaft No. 19 is a timbered shaft; it is eighty-seven feet deep, dimensions four by six, and has [1082] been sunk through the surface debris or the wash nearly to the bottom. The wash on the west side extends to a depth of eighty feet, and the east side to a depth of seventy-eight and a half feet. The shaft has been sunk in the country rock of the district below the wash; the exposures in the bottom of the shaft are simply two branches or planes of the continental fault. One of these occurs along the west side of the shaft, and the other close to the east side of the shaft. Each of these has a strike a little west of north. The westerly one has a dip to the east of approximately fifty degrees, and the easterly one a dip to the east of approximately seventy degrees. These two faults are clearly and easily seen. Their strikes can be measured. There can be no question about their course. There is nothing else in the shaft whatsoever on which the course or strike could be taken. The material between the two faults is partly altered granite, a little of the iron oxide stain, which is nothing but rust and no copper staining whatever. The material outside of these lines of fault exposed is similar to the material between them, in so far as it can be seen; these lines of fault are pretty close to the east and west sides of the shaft, respectively; the material between the faults is partly altered granite.

The first tunnel east is designated as tunnel No.

(Testimony of Frank A. Linforth.)

35 on Defendants' Exhibit No. 1; it is driven in a generally northeasterly direction. It is approximately a hundred and fifty feet long, beginning at the extreme end of the cut, and it is driven clearly and distinctly through the wash or surface debris, to within a point about ten feet from the end; the exposures in the end of the country rock are only the bottom two feet of the cross-cut or the tunnel. The rock exposed [1083] there is partly granite and partly aplite. There is nothing there upon which a strike or course could be taken, and there is no question but what that mineral is the country rock of the district. Within five feet from the end of this tunnel, a cross-cut five feet or so in length has been run, in a northwesterly direction, and the exposures are exactly what I have spoken of. The granite and aplite are intermingled, as they frequently are; the aplite has irregular boundaries with reference to the granite; aplite is an igneous rock that intrudes into the granite.

Tunnel 36 on Defendants' Exhibit 1 is a tunnel with certain cross-cuts, the general direction of the tunnel being northeasterly and from its start from the opening of the cut, it extends through the wash or surface debris for a distance of about seventy feet; the country rock of the district appears in the workings at that point and is exposed in all of the workings. There is one cross-cut at a point about a hundred feet in from the opening, which runs in a southeasterly direction. The exposures in that are unqualifiedly granite; there is a cross-cut from the same

(Testimony of Frank A. Linforth.)

point that runs northerly; the exposures in that are particularly granite, without qualification whatever. The continuation of the tunnel from that cross-cut, for a distance of about thirty feet, is in a mixture of granite and aplite, similar to that association which I mentioned in tunnel No. 35. Near the end of tunnel No. 36 a cross-cut has been run northeasterly for a distance of about thirty feet. The exposures in this cross-cut are the same as in the tunnel approaching it, namely, the associations in the last cross-cut mentioned, one of the planes or portions of the continental fault is observable; it has a distinct strike and dip, [1084] and there can be no question about its course. It runs a trifle east of north, and dips very nearly vertical, and there is also a fault plane parallel with it, as to strike, close to the end of the tunnel. In neither of these cases is there any doubt as to its course or dip. The end of the tunnel is the extreme northeast end of the tunnel,—what miners term the face.

Tunnel 37 on Defendants' Exhibit 1 is entered through a hole near its northeasterly extremity. It is a tunnel with a northeasterly course, driven mostly in the wash, but is entered through a hole near its northeasterly extremity. From this point, where you enter, a cross-cut has been driven practically northerly, sufficiently far to come under the Mullins tunnel, and a raise or an opening has been made from this cross-cut to the Mullins tunnel, holing into the Mullins tunnel at a point before the tunnel actually entered the side of the hill,—in other words, holing

(Testimony of Frank A. Linforth.)

into the cut; the exposures in this cross-cut are granite and aplite; in order to be certain of that, it was necessary to have some work done there, namely, to throw aside the accumulation of material that was in the bottom of the cross-cut, so that we absolutely saw the granite and aplite in place; the back, or the roof of this cross-cut, is in the wash. Now, continuing in a northeasterly direction from the point at which we entered this working, a short cross-cut has been run parallel with the one that I mentioned, and similar exposures to those which I mentioned are seen there, namely, granite and aplite. The cross-cut in a southeasterly direction, has the same exposure; there is nothing whatever of vein structure discernible in any of those openings; there is no fault; there is nothing but the country rock of the district. [1085] In tunnel 37 the chrysocolla staining is almost entirely absent. I have no note of chrysocolla staining in that cross-cut. The entire back of this cross-cut is in the wash; bedrock as exposed in the sides and the bottom of those cross-cuts from tunnel 37 was in place in the sides; I could not see the bottom, because all of the material was not removed.

In the Mullins, or Hornet tunnel, we have an opening approximately east and west. From a point about ninety feet from the entrance, from the beginning of the cut, a vein is observed coming in at the left-hand side of the tunnel, as you enter the tunnel. This vein is particularly well defined. Its hanging-wall and footwall are easily discernible. The dip and strike of this vein can be easily measured. Its defi-

(Testimony of Frank A. Linforth.)

nite boundaries can be established, and it is traceable to the end of the Mullins tunnel. At a point about a hundred and fifty feet from the actual entrance, from the beginning of the cut, a cross-cut is run from the Mullins tunnel to the Hornet shaft,—at least, so it appears. At the place where the cross-cut starts from the Mullins tunnel, one of the planes or portions of the Continental fault crosses the Mullins vein and occasions a slight displacement of the Mullins vein, not destroying its absolute continuity, however, because the vein can be seen on both sides of the fault. The cross-cut itself is clearly in the country rock of the locality, namely granite. It has suffered a green staining, the theory of which I endeavored to give earlier, and this staining continues out to the Hornet shaft, and, in less degree, in the Hornet shaft. The sides of the cross-cut expose the rock in place. The back of the cross-cut is in the wash. By taking separate pieces of the material out of the sides of the cross-cut and examining it, all [1086] of the constituent minerals of granite are present. Names are simply given to rocks to classify them by their constituent minerals, and if I find granite as you find quartz, feldspar and mica, you have granite. That is what we have throughout the entire length of that cross-cut. Throughout the length of the cross-cut, the feldspars of the granite have absorbed the chrysocolla to which I have referred. In addition, we have a small joint plane, in which a little more of the chrysocolla has been enabled to accumulate; that will be found close to the bottom of the cross-cut, and close

(Testimony of Frank A. Linforth.)

to the Hornet shaft; a fault is visible in the cross-cut, the one that I mentioned, without displacing the vein, very slightly, can be traced into the cross-cut and passes out of the side of the cross-cut, at a point south of the Gulf Discovery shaft; a very little of the mineralization of the vein itself has worked its way out into the fissure of the fault, for a short distance, which is a common occurrence in faulting; this mineralization can be characterized as chrysocolla. The sides of that upper cross-cut are in the bedrock, nearly to the back, and as you approach the Hornet, the wash becomes lower; there is only about half of the bedrock in the Hornet shaft, exposed in the upper cross-cut. I examined the floor of that upper cross-cut; I was able by that examination to confirm the course of the fault, and to confirm my opinion that the sides of the cross-cut were in the country rock of the district, in the granite. The Hornet shaft, as it exists to-day, is a shaft thirty-seven and a half feet deep, below a platform and from which the work has been done; the surface debris or wash on the southwest side of this shaft, extends to a depth of twenty-five feet, and on the northeast side to a depth of twenty-three feet; I measured the depth of [1087] that shaft by lowering a tape from the platform from which the work was being done; the platform was elevated from the surface of the ground about four feet. The Hornet shaft is sunk in the country rock of the district. Below the points mentioned, twenty-five and twenty-three feet on each side of the shaft, the rock is absolutely in place, and can be easily observed.

(Testimony of Frank A. Linforth.)

It has suffered some of the staining referred to in the Gulf cross-cut, though not to such an extent, and of less extent in going to the bottom. The very small joint plane, in which a little chrysocolla is collected, to which I referred in connection with the cross-cut, shows only in one place, and then indefinitely, so that its connection is not positive in the Hornet shaft. It passes under the wash, so that it naturally does not show, but on the side where the wash is lower, a small crack can be seen, which may be the same crack as can be seen in the cross-cut, but it is not positive,—it is not a certainty that that is the case. The mineralization in this little crack is only a trifle more than in the balance of the rock of the Hornet shaft. That, I believe, is a complete description of the Hornet shaft. The streak of mineralized material I have just referred to is probably the one to which testimony has been given; it would disappear in the wash and be not visible in any way if it continued from its position in the Hornet cross-cut, but at the point where the wash is lower, the twenty-five foot side,—the southwest side; a small crack is seen there; its continuity from the one in the south side is not established. On the northwest side of the Hornet shaft, nearly at the bottom, nine or ten feet from the bottom, a similar minute joint plane of indefinite dimensions as to length and thickness is observed,—a mere joint plane in the [1088] granite, mineralized only a trifle greater than in the rock than in the shaft itself. On three sides where the Hornet shaft is exposed, it is unqualifiedly the country rock of the dis-

(Testimony of Frank A. Linforth.)

trict,—granite. This staining of chrysocolla in the Hornet Discovery shaft occurs similar to the staining in the Gulf cross-cut, but in less quantity, and in less quantity still as you go deeper. The lower cross-cut, running from the bottom of the Hornet Discovery shaft northerly, underneath the Hornet tunnel, runs in a general northerly direction for a distance of about twenty feet, where it encounters a stope driven on the Mullins vein, from the Mullins shaft, probably; the reason that I say it is on the Mulline vein is that from this stope a raise has been run to the level above, and the vein is clearly defined and easily observable in the raise in the stope, and in the drift directly above it; at the point where the cross-cut meets this stope, two small planes or portions of the continental fault are observable; one of them is seen to dislocate the vein, the same as it did in the level above, and is unqualifiedly the same fault; it can be traced through the raise and the throw is similar; in the cross-cut itself the granite has undergone the painting or the saturation of the soft feldspars with the chrysocolla, but to a very decidedly less extent than in the level above; the joint plane is observable in the granite in this cross-cut, in which a little more of the chrysocolla has accumulated, the receptacle being larger a little more of the material has been able to reside there; but that is a joint plane is unquestionable, because it terminates against another joint plane; I think that is a description of the lower work to the north. I spoke of a fault plane occurring in that lower cross-cut, near its northerly end; [1089]

(Testimony of Frank A. Linforth.)

I believe those are correctly represented on those maps, Complainant's Exhibits 15 and 16. The adjoining mass to the lower cross-cut is the country rock of the locality, namely, granite, which has suffered some staining, similar to that in the cross-cut above, but to a decidedly less extent.

I examined the small shaft, or southerly cross-cut, from the bottom of the Hornet shaft, and appearing on the map Defendants' Exhibit 16; that is but a short cross-cut, exposing only granite, with the exception of a well-defined plane or portion of the continental fault. The strike of this portion of the continental fault is north twenty-five west, and its dip approximately vertical. No vein is exposed in that cross-cut. I call the vein exposure in the Hornet tunnel a true fissure vein, without qualification; its walls are decidedly defined walls and could not be mistaken by one accustomed to platting them; both walls are visible nearly throughout the whole length of the tunnel; the hanging-wall may recede into the south side of the tunnel at the point where the fault crosses it; it dislocates the vein a trifle to the south, going easterly, and the hanging-wall is outside of the tunnel, but that is the only point at which that is true; that fault appears at a point about ten feet from the end of the tunnel,—the face; that particular fault, in my opinion, is another branch or portion of the continental fault; its strike is easily obtained,—north twenty-five west,—and it has a dip to the east of eighty-seven degrees; as you proceed to the face of that tunnel, the Hornet or Mullins tunnel, the size of

(Testimony of Frank A. Linforth.)

the vein is about eight or ten inches; it apparently diminishes as you progress east. I observed the walls of that vein throughout the Hornet or Mullins tunnel, and the vein is well mineralized; I consider [1090] the wall a plane; in the country beyond the wall I do not consider that mineralization; it is a mere painting; in the walls of the Mullins veins and throughout the cross-cut I do not consider the country mineralized. Mineralization by replacement in the chemical substitution of some particular element for some other particular element and in replacement processes, it is a well-known fact that the ferro-manganese, or the dark constituents of the granite, are the most easily attacked and always go first; they are still intact throughout the workings in question,—absolutely visible; in the joint plane to which I referred, a little of the copper oxide, cuprite, was observed. This chrysocolla and cuprite in the cross-cut or the Hornet shaft in cases was easily observable,—that the continuity was limited to a very short extent; one joint plane would be seen meeting another, mineralization ceasing at that juncture; in some cases that was distinctly observable. The Hornet Discovery shaft is approximately five feet square; at the point where the upper cross-cut enters it it is widened out somewhat by caving of the wash and soft material there; it is a little larger than five feet square. I took samples from the Hornet workings. The object of this collection of samples was to show the material throughout the entire length of this cross-cut and in order to do that one piece of material has been

(Testimony of Frank A. Linforth.)

taken from every foot through the length of that cross-cut, beginning at a point close to the tunnel and extending foot by foot up to and including the Hornet shaft,—in some cases on the east side of the upper cross-cut, and in some cases on the west side, but so taken that the end of the series on the east side would meet or overlap with the end of the series taken on the west side. I crossed from side to side in the cross-cut in taking these [1091] samples in order to get a line straight through, so that I would get the offset, due to the Gulf Discovery shaft; the offset is the width of the shaft; I was desirous of getting samples directly through the length of the cross-cut, at right angles to the alleged vein, and I could not get a straight line through one side without moving to the other. This material was taken at a point four feet from the bottom, and one piece was taken from each foot, beginning at a point three feet from the side of the tunnel and extending to a point seven feet from the side of the tunnel, on the east side of the upper cross-cut, in this case. Mr. Berrien and I took these samples together, and we together marked the sacks containing the exhibits; the material is so nearly similar, that if I may return it to the sack I will go on to the next one.

One piece of this sample was taken and accurately represents each foot starting at a point measured from a station in the center of the Mullins drift. The actual distance we measured was seven feet for the starting point, of this sample, which is close to the hanging-wall of the Mullins vein; by station I mean

(Testimony of Frank A. Linforth.)

a surveyor's term, which means a point. Each piece, as I say, represents a foot of the ground,—one from that starting point, one from a point eight feet, one from a point nine feet, and from a point ten feet, one from a point eleven feet and one from a point twelve feet; our starting point was seven feet from the station, which point, however, is the hanging-wall of the Mullins vein, and the east side of the upper cross-cut. The material fairly shows the ferro-magnesian constituents, the dark material, the glass quartz and shows no vein material. There is no banding, no vein quartz, nothing in that piece that in any way resembles a vein, and the same description [1092] applies to these five pieces. At the point where this exhibit was taken from, the side of the cross-cut is entirely in the bedrock, the wash only being in the back, and it was taken from an elevation of about two feet above the bottom of the cross-cut, and it was taken with a decided intent to make it representative of the material of that cross-cut at that point, namely, a piece here, a piece from here, and a piece from here,—whatever piece happened to come within that foot; I say it is an accurate representative.

By Judge BOURQUIN.—We will offer that in evidence.

By the EXAMINER.—I will mark that Complainant's Exhibit No. 31.

The WITNESS.—The four pieces now presented are taken similarly to those previously presented and the measurements are from twelve to sixteen feet,—that is, the first one came at the point thirteen feet,

(Testimony of Frank A. Linforth.)

the second at a point fourteen feet, and the third at a point fifteen feet, and the last at a point sixteen feet, from our starting point. The first one of these was taken a foot from the last one in Exhibit 31 on the east side of the cross-cut, and the object was to show that between the point twelve feet and sixteen feet no vein passed through there, to show representative material for that area of ground, and about two feet above the floor of the cross-cut. The only evidence of mineralization in this exhibit is the painting or staining referred to in the early part of my examination; I say there is not mineralization by replacement in this exhibit, because the constituent parts of granite, namely, quartz, feldspar and mica, or more generally ferro-magnesian constituents, are still present, and the ferro-magnesian constituents are the ones always attacked first in a replacement process. [1093] They are still perfectly visible in all these pieces; the material of this exhibit is granite.

By Judge BOURQUIN.—We offer it in evidence.

The EXAMINER.—I will mark that Complainant's Exhibit No. 32.

The WITNESS.—The next one is a similarly taken representative sample from points between sixteen feet to twenty feet; the last one in the other sample was at a sixteen-foot mark, the first one of this is at the seventeen-foot mark, then the eighteen, then the nineteen, then the twenty-foot mark, on the east side of the upper cross-cut, about two feet from the bottom. The material in this exhibit is granite. There is a slight diminution of the staining in this exhibit,

(Testimony of Frank A. Linforth.)

otherwise it is the same as exhibits 31 and 32; the staining in the exhibit on the table and the two last referred to is chrysocolla. This exhibit is representative of the area, or the band of ground, between points sixteen and twenty feet from the starting point.

By Judge BOURQUIN.—We offer it in evidence.

The EXAMINER.—I will mark that Complainant's Exhibit No. 33.

The WITNESS.—The next sample was taken from, one piece from each foot between the points twenty and twenty-four feet; the first piece, coming from a point twenty-one feet, second from a point twenty-two feet, third from a point twenty-three feet, and the fourth from a point twenty-four feet; these measurements are from a station or point established in the center of the Mullins drift as before stated; this exhibit was taken from the west side and a little closer to the bottom than the previous ones, because the drift was approaching the bottom also, and I endeavored to keep close to the wash; all these exhibits were taken from the rock in place there; each piece [1094] is a piece of granite; the feldspars have a little chrysocolla deposit in them, but the quartz is still glassy and unpainted and the ferro-magnesian constituents are still intact and unpainted; the mica is one of the ferro-magnesian constituents, and is observable distinctly in the samples; the staining in this exhibit is chrysocolla.

By Judge BOURQUIN.—We offer it in evidence.

(Testimony of Frank A. Linforth.)

The EXAMINER.—I will mark that Complainant's Exhibit No. 34.

The WITNESS.—That is a representative sample for the distance between points twenty and twenty-four feet. The remaining measurement was six feet to bring me to the corner of the Hornet shaft, consequently it takes six pieces to represent that band of ground in the same way; the material presented is representative of the remaining six feet up to the Hornet shaft, one from each foot,—the first piece one foot from exhibit 34, on the west side of the upper cross-cut, near the bottom of the upper cross-cut; the wash approaches on that side about halfway down, as you go to the Hornet discovery shaft; that sample is representative of the material there; it is granite, all of the constituents being clearly observable; there is nothing about it of the character of a vein. The texture and structure of granite is perfectly apparent here; that is characteristic granite texture.

By Judge BOURQUIN.—We will offer it in evidence.

The EXAMINER.—I will mark that Complainant's Exhibit No. 35.

The WITNESS.—I have a sample from the Hornet workings of five pieces, which is taken across the east side of the Hornet discovery shaft, which is to be a continuation of the samples just taken,—it is lower down in the shaft, four feet above the bottom; I mentioned five pieces,—the fifth one is disintegrated; [1095] this granite is pretty close to the

(Testimony of Frank A. Linforth.)

surface of bedrock, and any granite is easily disintegrated under those conditions; it being put into the sack with two or three other pieces, it was crumbled up. This was taken in the same manner that the others were taken,—one piece for each foot across the east side of the Hornet shaft, and it is representative of the material through which the shaft was sunk, because it occupies the complete eastern side of the shaft; it is granite; it is similar to the exhibits produced just before it, save that the painting of chrysocolla is to somewhat less extent; that piece, for instance (referring to one piece of sample), is lighter than pieces from the other.

By Judge BOURQUIN.—We will offer it in evidence.

The EXAMINER.—I will mark that Complainant's Exhibit No. 36.

The WITNESS.—Mr. Berrien was present at the time of the taking of all of these exhibits. I took samples from the Hornet workings for assaying; I took samples from the Gulf cross-cut in such a way that the returns from the assay would show me the copper contents of that block of ground which the sample represented, and the sample was taken in such a way as to correctly and accurately represent the material through which the cross-cut was driven. There is a recognized way by geologists and engineers and mining men, for taking samples upon which to base a fairly accurate opinion as to the value of the ground, and I conformed to that method; I had those samples assayed and have the certificate of the as-

(Testimony of Frank A. Linforth.)

sayer here. The samples you are now questioning me about, Mr. Berrien was present at their taking with one exception, when Mr. Fisher was present. They were assayed by the assayer for the Anaconda Copper Company, Mr. Feebles.

[1096] By Judge BOURQUIN.—We will state that we will produce Mr. Feebles later to testify to the accuracy of his assaying.

The WITNESS.—In order to present the samples and return in exactly the position in which I took them, I have prepared a section, on which I have written the returns copied from the certificate which I have here,—it is in the shape of a map or sketch; it represents a cross-section through the Gulf cross-cut; it represents the workings from the surface to and including the lower cross-cut, including the raise from the lower cross-cut to the Mullins drift, including the Hornet shaft, Gulf shaft, and the Gulf cross-cut, and the opening above the Mullins tunnel, opposite the cross-cut, and including the lower cross-cut.

By Judge BOURQUIN.—We will offer it in evidence.

The EXAMINER.—I will mark it Complainant's Exhibit No. 37.

The WITNESS.—The numbers on the exhibit No. 37 and the numbers on the assayer's certificate are identical. Samples 1, 2 and 3 are samples taken beginning at the hanging-wall of the Mullins vein and extending to the Hornet shaft, each one representing the same amount of length as the other ones, namely, about nine feet, and one sample adjoining

(Testimony of Frank A. Linforth.)

directly on to the other, each sample containing exactly the same amount of material, from each portion of the nine feet sample. Sample 1 was taken by measuring the distance first and taking from the side of the cross-cut, at a point about two feet from the bottom, an amount of material equal in all cases throughout the length, and leaving a little trench throughout the length of nine feet and the material deposited in a sack and taken to the assayer; sample No. 1 was taken along the east side of the first nine feet, of the upper cross-cut, and the return on the [1097] assay of that sample is one and nine-tenths per cent copper, and four-tenths of an ounce in silver. Sample No. 2 is a continuation as regards crossing the cut, taken from the west side, the northern end of it being opposite the southern end of sample No. 1,—west side of the Hornet cross-cut, in continuation of the sample just described; having measured the position of it, a small amount was taken with a pick, exactly the same amount from every inch throughout the length of nine feet, and the material deposited in the sack and taken to the assayer. The assayer's return on that sample is a little less than the first one; it is one and seven-tenths per cent of copper and a trace only of silver. Sample No. 3 starts from the end of sample No. 2, taken on the west side of the Hornet upper cross-cut, extends to the Hornet shaft,—was taken so as to correctly represent the assaying value of the block of ground through which the cross-cut has been driven; the returns are copper, one and four-tenths per cent, trace

(Testimony of Frank A. Linforth.)

in silver. That is the assayer's certificate on those three samples.

By Judge BOURQUIN.—We offer it in evidence.

The EXAMINER.—I will mark that Complainant's Exhibit No. 38.

The WITNESS.—Samples No. 4 and 5 were not taken from this particular locality. They were taken from the other shaft. No. 6 was a sample taken in the lower Hornet cross-cut, on the west side, for a distance of ten feet, two feet from the bottom, beginning at the north side of the Hornet shaft and extending for a distance of ten feet to the north; it was taken in the same way, so as to obtain the correct value of that ground; the assayer's returns for that sample are seven-tenths of one per cent of copper and no silver; here is the certificate.

By Judge BOURQUIN.—We offer it in evidence for the purpose of this return on sample No. 6 and will prove it for the others [1098] later.

The EXAMINER.—I will mark that Complainant's Exhibit No. 39.

The WITNESS.—I should like to mention next sample No. 13, because it is the continuation of sample No. 6, and particularly, the assays from the point last sampled up to the hanging-wall of the Mullins vein; it was taken at a point about two feet from the bottom, on the east side of the cross-cut,—the lower Hornet cross-cut; it is a continuation, as regards length, of sample No. 6, and was taken in accordance with the principles of sampling, so as to properly evaluate the ground through which the

(Testimony of Frank A. Linforth.)

cross-cut was driven; the assayer's returns are copper, nine-tenths of one per cent, silver one-tenth of an ounce. The next series will be Nos. 8, 10 and 12, taken at intervals in the Hornet shaft on the east side, and from the extreme south side of the shaft to the north side of the shaft, so as to cover any vein or material of any sort which might be in that shaft, because every portion of the material through which the shaft is sunk must be shown in those samples. The intervals between the samples is five feet; we start at a point seven feet from the bottom, and the intervals are then five feet, bringing you nearly to the bottom of the wash. They were taken so as to correctly evaluate the ground through which the shaft was sunk. No. 8 is taken across the east side of the Hornet shaft, almost a continuation of the upper cross-cut into the Hornet shaft,—a trifle above, taken across the entire east side of the Hornet shaft, in the manner already described for the other samples. The assayer's return for sample No. 8 is copper one and four-tenths per cent, silver four-tenths of an ounce. The next sample taken below is No. 10, taken at a point five feet below the No. 8 sample, including all of the material [1099] through which the extreme south side of the shaft to the extreme north side of the shaft, and having an equal amount of the material throughout its length, and otherwise taken as specified for the other samples; the returns for sample No. 10 are eight-tenths of one per cent copper, and two-tenths of an ounce of silver. The next sample is No. 12, taken

(Testimony of Frank A. Linforth.)

across the east side of the Hornet shaft, similar to Nos. 8 and 10, at a distance of five feet below them, so as to keep an equal sampling interval, and taken in accordance with the principles of sampling; that came from about the same elevation as the top of the entrance of the bottom cross-cut; the assayer's returns for sample No. 12 are six-tenths of one per cent copper, trace in silver. I took other samples in the Hornet workings,—Nos. 14 and 15; sample No. 14 is a sample of the material of the Mullins vein, such material as would be excavated in mining the Mullins vein at the point where the lower Hornet cross-cut meets it; the sample is one foot wide and was taken so as to correctly evaluate that piece of ground, taken from the hanging-wall to the foot-wall at that point, including the material in it; the returns for sample No. 14 are copper, five per cent, silver, three-tenths of an ounce. Sample No. 15, is a sample taken across the Mullins vein at a point opposite the Gulf cross-cut, in continuation of sample No. 1, with regards to a northerly direction. It was taken from a width of one foot across the vein, and correctly evaluates the material of that one foot width; I limited myself to one foot in order to keep my sample opposite the numbers 1, 2 and 3, I was obliged to take it at a place where a portion of the vein had been excavated—that foot was next to the hanging-wall; the assayer's return for sample No. 15 was copper seven and [1100] four-tenths per cent, silver four-tenths of an ounce. I also took samples Nos. 7, 9 and 11 in the Hornet workings.

(Testimony of Frank A. Linforth.)

Sample No. 7 was taken from a point measured seventeen feet up from the bottom of the shaft; it was taken across the north side of the shaft for a distance of five feet—more properly the northwest side of Complainant's Exhibit 15, and about three feet above the floor of that cross-cut; that sample was taken for the purpose of checking another examiner and taken at the exact point at which he took his, to check the samples taken by Mr. Watson; that sample was taken on the northwest side of the Hornet shaft; the north end of it comes to the side of the cross-cut; the point was accurately measured from the bottom of the shaft, and it comes about three or four feet above the floor of the cross-cut, just below the wash. The assayer's returns on that sample are copper one and three-tenths per cent, silver eight-tenths of an ounce. Sample No. 9 is taken at a point where Mr. Watson also samples, or at least as near to it as possible. It was taken from a point measured six and one-half feet up from the bottom of the Hornet shaft, on the west side, or northwest side, and taken in accordance with the principles of sampling, across the northwest side of the shaft; there is a joint plane in the shaft at that point that has collected a little more of the chrysocolla than the surrounding rock; it comes just at the point to which the sample taken by Mr. Watson measures, and the record of a sample was found in this crack; this sample appears to have been taken so it would follow this little crack; I took mine in a horizontal direction, as near to that as possible, and it crossed the line of my sample; the line of this joint

(Testimony of Frank A. Linforth.)

across the east side of the Hornet shaft, similar to Nos. 8 and 10, at a distance of five feet below them, so as to keep an equal sampling interval, and taken in accordance with the principles of sampling; that came from about the same elevation as the top of the entrance of the bottom cross-cut; the assayer's returns for sample No. 12 are six-tenths of one per cent copper, trace in silver. I took other samples in the Hornet workings,—Nos. 14 and 15; sample No. 14 is a sample of the material of the Mullins vein, such material as would be excavated in mining the Mullins vein at the point where the lower Hornet cross-cut meets it; the sample is one foot wide and was taken so as to correctly evaluate that piece of ground, taken from the hanging-wall to the foot-wall at that point, including the material in it; the returns for sample No. 14 are copper, five per cent, silver, three-tenths of an ounce. Sample No. 15, is a sample taken across the Mullins vein at a point opposite the Gulf cross-cut, in continuation of sample No. 1, with regards to a northerly direction. It was taken from a width of one foot across the vein, and correctly evaluates the material of that one foot width; I limited myself to one foot in order to keep my sample opposite the numbers 1, 2 and 3, I was obliged to take it at a place where a portion of the vein had been excavated—that foot was next to the hanging-wall; the assayer's return for sample No. 15 was copper seven and [1100] four-tenths per cent, silver four-tenths of an ounce. I also took samples Nos. 7, 9 and 11 in the Hornet workings.

(Testimony of Frank A. Linforth.)

Sample No. 7 was taken from a point measured seventeen feet up from the bottom of the shaft; it was taken across the north side of the shaft for a distance of five feet—more properly the northwest side of Complainant's Exhibit 15, and about three feet above the floor of that cross-cut; that sample was taken for the purpose of checking another examiner and taken at the exact point at which he took his, to check the samples taken by Mr. Watson; that sample was taken on the northwest side of the Hornet shaft; the north end of it comes to the side of the cross-cut; the point was accurately measured from the bottom of the shaft, and it comes about three or four feet above the floor of the cross-cut, just below the wash. The assayer's returns on that sample are copper one and three-tenths per cent, silver eight-tenths of an ounce. Sample No. 9 is taken at a point where Mr. Watson also samples, or at least as near to it as possible. It was taken from a point measured six and one-half feet up from the bottom of the Hornet shaft, on the west side, or northwest side, and taken in accordance with the principles of sampling, across the northwest side of the shaft; there is a joint plane in the shaft at that point that has collected a little more of the chrysocolla than the surrounding rock; it comes just at the point to which the sample taken by Mr. Watson measures, and the record of a sample was found in this crack; this sample appears to have been taken so it would follow this little crack; I took mine in a horizontal direction, as near to that as possible, and it crossed the line of my sample; the line of this joint

(Testimony of Frank A. Linforth.)

plane or crack crosses my sample; the assayer's return for that sample shows copper one per cent, silver two-tenths of an ounce. [1101] I took that sample from the west side of the shaft as identified on Complainant's Exhibit 15—referred to in Mr. Watson's testimony as the west side; the line of my sampling at the point last mentioned, where I took No. 9, intersected the evidences of the former sampling by someone. I also took sample No. 11, from one foot up from the bottom, on the south side of the Hornet shaft, for a distance of four feet, and taken in accordance with the principles of sampling—four feet in a horizontal direction, along the south side of the shaft—more properly I should say the southeast side of the shaft, in the country rock of the locality; a little trench was dug from the northeast corner for a distance of four feet, which included all of the shaft, and the material removed, was so removed as to be a correct sample; it is the continuation of the cross-cut from the bottom of the Hornet shaft; the return of the assayer on that sample was four-tenths of one per cent copper and a trace in silver. Here is the assayer's certificate for samples 7 to 15.

By Judge BOURQUIN.—We offer it in evidence.

The EXAMINER.—I will mark that Complainant's Exhibit No. 40.

The WITNESS.—Mr. Berrien and I both worked on the sampling. Complainant's Exhibit No. 37 is an approximation of the material exposed; it is a section through the ground, into which certain work-

(Testimony of Frank A. Linforth.)

ings have had to be projected a short distance. On that exhibit the numbers 1 to 15 are the numbers of the samples corresponding to the number on the certificate, that I have just testified to; as you proceed southward in the cross-cut from the hanging-wall of the Mullins vein, there is a regular diminution of copper content, up to and including the sample taken in the Hornet shaft at that elevation; the sample taken [1102] from the Mullins vein itself shows a decidedly higher grade of copper than is found in the country rock in the cross-cut. I got an exhibit from tunnel 37—five pieces of material taken from the cross-cut north from tunnel 37, to and including the shaft or winze connection at the end up to the Hornet tunnel; the material is aplite, with the merest trace of mineralization, and that on the surface, not inside of the rock—a trace of chrysocolla evidenced by the very faint tinge of color—green, very faint, and I believe it to be representative of the material exposed in the cross-cut from tunnel 37 northerly.

By Judge BOURQUIN.—We offer it in evidence.

The EXAMINER.—I will mark that Complainant's Exhibit No. 41.

The WITNESS.—I visited the Vesuvius workings; the Vesuvius shaft is a timbered shaft forty-two feet deep; the wash extends to a depth of thirty-one feet; from the bottom of it a cross-cut has been run in a generally northerly direction and it is driven through the country rock of the locality; only a little of the staining referred to in the Hornet shaft, is apparent in this country rock, which is granite; and

(Testimony of Frank A. Linforth.)

there are encountered three very small joint planes in the granite of various dips and strikes, some of which are seen to terminate against other joint planes, thereby identifying them as joint planes; they appeared in the north cross-cut from the shaft. There is a south cross-cut from the shaft for a distance of about thirty feet, from which a drift has been run in a generally easterly direction; I speak of it as a drift because the work was turned so as to drive along on a large joint plane—one of the joint planes of the granite, against which smaller joint planes terminate, and this phenomenon can be clearly seen. Some joint planes in that little drift run up to and terminate in the joint [1103] plane I now mention. A little mineralization occurs in this larger joint plane. From the end of the drift, which is about twenty-five feet long, a short cross-cut has been run southerly into the granite, exposing no vein; the general mass of the country in the Vesuvius workings was granite, stained slightly by chrysocolla to an extent considerably less than at places where the staining has been seen higher up; this is forty-two feet deep, about eleven feet below bedrock, which staining was general throughout all of the Vesuvius cross-cuts and cross drift.

I visited shaft No. 3, on Complainant's Exhibit 14, or No. 9 on Defendants' Exhibit 1. Shaft No. 3 on Complainant's Exhibit No. 14, or No. 9 on Defendants' Exhibit No. 1, is a timbered shaft. Measured from the present surface to the bottom, it is forty-five feet but an accumulation of rubbish in the bottom

(Testimony of Frank A. Linforth.)

makes the actual bottom indeterminate. It was extended from the collar of this shaft to a point thirteen feet below the collar. The east end of this shaft,—the lagging in the east end of this shaft, between points thirteen feet to twenty feet, has been removed, so that an exposure of the material through which the shaft was sunk is easily observable; the material in that shaft is clearly granite; there is no evidence of mineral-bearing matter in the shaft. At a point twenty-five feet from the collar of the shaft, a short cross-cut has been run in a generally northerly direction for a distance of about ten feet. At a distance of about five feet from the timbers of the shaft in this cross-cut, there is exposed a small slip in which a little mineralization has resided. It disappears to the south. Another one, equally small,—in fact smaller,—occurs in the same cross-cut, about a foot beyond that, and [1104] granite lies between them; there is just a little staining of chrysocolla in the granite of the cross-cut. To differentiate between a slip and a fault it will be necessary to refer to the mass of the granite; the granite is not a solid unit mass. It is broken into blocks. The bounding planes of these blocks of granite are known as joint planes; it would be impossible to find one piece of granite of any very large dimensions. The granite is bounded by these joint planes. Now, when one of these blocks of granite, for any cause whatsoever, is moved on the other one, the joint plane shows evidence of the movement, and is termed a slip; the dimensions of a slip are related to the dimensions of the

(Testimony of Frank A. Linforth.)

blocks of granite, which may be as large as this room, but the dimensions of the masses which move on the plane of a fault are related to cubic miles. A fault is a dislocation of one mass of the earth relative to another; the plane upon which dislocation has taken place is evidenced in the ground by certain clay and crushed material; the fault exists independent of the joint planes; a joint plane must be of limited extent, due to the blocking of the granite while the fault may be, in a qualified sense, of unlimited extent, due to the fracturing of the blocks.

I also visited shaft No. 2 on Complainant's Exhibit No. 14, which is a rectangular opening eighteen feet deep and the wash extends to a depth of nine feet. The bottom of this shaft is a clear exposure of the country rock of the locality; there is almost entirely aplite,—a little granite occurs on the west side. The aplite occurs in shaft No. 2 in its usual relation to the granite, namely, with irregular boundaries. I secured a sample from shaft No. 2, which is aplite; aplite is a country rock; no evidences of mineralization other than iron.

[1105] By Judge BOURQUIN.—We offer it in evidence.

The EXAMINER.—I will mark that Complainant's Exhibit No. 42.

The WITNESS.—I took a sample from shaft 2 for assaying; I took it from the east side of shaft No. 2, and for the full width of the shaft, because there was no choice between the east and the west side. I took it to Mr. Feebles, the assayer of the Anaconda

(Testimony of Frank A. Linforth.)

Copper Company, and he gave me a certificate. That sample is No. 5,—the one so designated on Complainant's Exhibit No. 39, and the returns are copper a trace, silver two-tenths of an ounce, and gold a trace.

I examined shaft No. 1 on Complainant's and Defendants' exhibits; the exposure therein is a rectangular opening eighteen and a half feet deep. The wash extends to a depth of eight and a half feet; the exposure of the bedrock is clearly the country rock of the district; there is granite and aplite; there is also a patch of more silicious granite, a phase of the granite a little more silicious than the rest, but the rock,—it is granitic composition, and the exposures are entirely aplite and granite. I saw iron oxide in shaft No. 1,—it appears on the planes, on the outside of pieces similar to the rust that would occur on the iron. I observed no cracks filled with different material, in the bottom of shaft No. 1. I took an exhibit from shaft No. 1; it is material taken at equal intervals one piece from each point clear across the west side of shaft No. 1, from north to south,—representing the material through which that shaft was sunk; part of it is granite, and a part of it is aplite; it is country rock; I saw no evidence of vein in shaft No. 1 or shaft No. 2. I took a sample from shaft No. 1 from across the west side of the shaft, and took it to Mr. Feebles to be assayed in his office, and he gave [1106] me a certificate; that sample is No. 4, which is so designated on Complainant's Exhibit No. 39; the returns are copper four-tenths of one per cent, silver three-tenths of an ounce, gold twenty cents per ton.

(Testimony of Frank A. Linforth.)

By Judge BOURQUIN.—We offer the exhibit from shaft No. 1 in evidence.

The EXAMINER.—I will mark that Complainant's Exhibit No. 43.

The WITNESS.—Such results are obtainable from almost any piece you can pick up. The country rock in the Butte district, and particularly in the copper producing section is impregnated to a very limited extent with copper, without replacement or constituting ore; it is not found generally in the country rock throughout the district. Chalcopyrite, which has been mentioned as being found through the country rock is an accessory; that does exist, but the quantity of an accessory mineral in a rock is very small; it is negligible; it would be difficult to get samples of the country rock throughout the Butte that would not return a trace of copper.

I visited shaft 21, on Defendants' Exhibit 1, which is a timbered shaft a hundred and ten feet deep; the wash extends to a depth of a hundred and seven feet; the material exposed in the bottom of that shaft is very much altered, but it still presents enough evidence to show that it was granite; the lines that you can see,—and you can see everything in the bottom of the shaft,—run distinctly northerly and southerly; they are planes of the continental fault; one of them occurs on the west side of the shaft and the other on the east side of the shaft; the material between them and exposed near them, outside of them, is altered granite, very decidedly altered; the slips have a decided, well-defined strike and dip of [1107]

(Testimony of Frank A. Linforth.)

northerly and southerly,—the dip is slightly to the east, and one strike is north seven west, and the other is parallel to it; I say they are part of the continental fault because we know of the existence of a continental fault, and we know from openings under the ground on it, that it is composed of a great many parallel planes; I consider the slips I referred to as true faults; there is no evidence of an easterly and westerly vein in that shaft.

I visited tunnel No. 30, which is so caved that it can only be entered through a hole at a point about a hundred and forty feet from the actual beginning of the diggings. From the point at which you enter the tunnel, a cross-cut has been driven southerly, and the tunnel itself extends on in its easterly course for a distance of about twenty feet, and a cross-cut has been run north for a distance of about twenty feet, close to the eastern face of the tunnel; a small plane, or portion of the continental fault, crosses the tunnel just before you reach the entrance of the north cross-cut; the course of that fault is north and south. The exposures, other than that fault, are granite, all except the end,—the south face of the south cross-cut, which is in aplite; the aplite in that cross-cut has been sheared a trifle at that point, but it is nevertheless aplite; there are planes in it observable easterly and westerly; they are part of the regular weathering of aplite. The aplite has rectangular faces, smooth planes, and that is exhibited in that point. I found no vein in tunnel 30.

I visited tunnel 31, which is driven in a generally

(Testimony of Frank A. Linforth.)

northeasterly direction; the cross-cut has been run north from a point about ninety feet from the actual entrance of the cut, and has gone through the granite for a distance of about twenty [1108] feet, when it encountered a small vein; the dip and strike of the vein are easily ascertained; it has well-defined, definite boundaries, a hanging-wall and a footwall, and a width not to exceed ten inches; the strike is north eighty east, and the dip eighty degrees to the north. The cross-cut is continued in a northerly direction beyond this point for a distance of about twelve feet, and a similar, though smaller, vein at a point ten feet beyond the point just spoken of; it, too, has definite, well-defined hanging and footwall, definite dip and strike; the strike and dip are parallel to the other, within a degree. The first vein is a vein not to exceed ten inches in width; the second one does not exceed four inches in width; the vein matter consists of some chrysocolla and a little quartz and iron; there is some aplite in the vicinity, which has made the fissure probably for the vein,—that is, the boundaries between the aplite and the granite have allowed a place for mineralization, of the south vein; the aplite lies on the north side of the vein; the rest of the country between and on each side of those two veins is granite; chrysocolla staining is slightly apparent in the granite,—less than in other places testified to heretofore. I went into the south cross-cut, where the exposures are granite, with a few stains of iron on the harder parts of the granite; there is no chrysocolla staining there; continuing in a northerly di-

(Testimony of Frank A. Linforth.)

rection, from the point where the cross-cut just spoken of starts, proceeding for a distance of about thirty feet, a vein is encountered on the left-hand side of the tunnel and can be traced along the left-hand side of the tunnel for a distance of about twenty-five feet; the dip of that vein corresponds with the dip of the vein in the cross-cut, namely, eighty degrees, and the [1109] strike is north sixty-five east. The vein is distinctly faulted as you proceed along the tunnel, cut off and displaced by a portion of presumably the continental fault; the strike of that fault is north twenty west; the vein is not visible on the east side of that fault; as you progress to the face of the tunnel, a parallel fault appears, of smaller dimensions than the main one, at a *point feet* further east than the fault just mentioned. The tunnel continues in granite to a point about twenty feet from the east face of the tunnel; at that point a short cross-cut has been run northerly,—hardly a cross-cut,—just a round taken out there, which exposes a flat northwest fault; the other exposures are granite; granite is exposed northward in the tunnel. I also entered the cross-cut south, near the face of the tunnel, and found exposures of the granite, with the exception of one joint plane, which I designated as a joint plane; there was a mere trace of the green stain in that cross-cut.

I also entered the tunnel marked No. 32 on Defendants' Exhibit 1; I found nothing there whatsoever in the way of a vein, but a very large plane of the continental fault,—presumably of the continental fault,

(Testimony of Frank A. Linforth.)

occurs near the end of tunnel No. 32; it has a north and south strike and is the largest fault exposed in the workings of this ground in controversy; it has a quantity of the usual, easily recognizable soft clay and granite or aplite, so crushed up in between as to be unrecognizable as the country rock. I was with Mr. Berrien when we located such points on Complainant's Exhibit 14 as were not given us on the map supplied by Mr. Kemper; the map was made by Barker and Wilson; it is a copy of the main Defendants' Exhibit 1 only additions have been made to it by [1110] subsequent workings; the rest of the matter on Complainant's Exhibits 14, 15, 16 and 17 was supplied from data taken by Mr. Berrien and I together; the maps you mention are fairly accurate representations of the opening which they represent,—by maps I mean the Complainant's Exhibits 14, 15, 16 and 17.

I desire to better identify the location where sample No. 9 was taken; I stated that it came from the west side of the Hornet shaft, at a point six and a half feet from the bottom, and I said that more properly it should be the northwest side; as a matter of fact, more properly it should have been the southwest side; it was taken just over the entrance of the top of the cross-cut, or drift, which runs in a southwesterly direction, indicated on Complainant's Exhibit 15; it is still the west side of the shaft, but more properly the southwest side of the shaft, rather than the northwest side, as stated last. Complainant's Exhibits 31 to 36, inclusive, are granite. Defendants' Exhibit 76 is a piece of granite, which is not

(Testimony of Frank A. Linforth.)

mineralized; it has on one side of it a little crust of copper sulphate; it has no connection with the granite; it is the result of the evaporation of a solution containing copper sulphate, leaving the solid copper sulphate on the surface of the granite; this could have had no connection with a copper vein; the sulphate is a different chemical compound from the chrysocolla formed in oxidation of copper sulphides, and itself extremely soluble in water; I would account for the presence of that copper sulphate in exhibit 76 by water running over a mine dump, for instance, might easily pick up copper sulphate, dissolve it very readily, and that water lying on the face of the rock somewhere below with reference to elevation, evaporated and left the solid copper sulphate just on the face of the rock. [1111] The material of Defendants' Exhibit 75 is granite; the glassy quartz, the ferro-magnesian constituents and the feldspar are all present, thereby identifying it as granite, but the feldspars have been sufficiently kaolinized to become porous and to have received a little of the chrysocolla, in accordance with the theory that I outlined before. Consequently, this granite has a slight green stain; it is nevertheless granite, and the mineralization is chrysocolla, which is the silicate; I would account for the presence of that in Exhibit 75 exactly in accordance with the theory set up for the occurrence on the Butte and Boston Placer,—there not having been enough solvents present to redissolve the chrysocolla; it was originally deposited in the granite of exhibit 75 by

(Testimony of Frank A. Linforth.)

means of the accessory mineral, chalcopyrite, similar to the occurrence on the Butte and Boston placer, except that this has not been dissolved out. There has not been enough iron solution present to take it away. Defendants' Exhibit 94 is a piece of granite, identified as such because I can see that it contains quartz,—the glassy portions,—feldspar, the dull white, or colored portions of the ferro-magnesian constituent; it has a little chrysocolla deposit in it, and that has had its origin from solutions which may have traveled from any distance up the hill and have deposited the chrysocolla in accordance with the theory set up previously,—the chrysocolla not having been dissolved out on account of the lack of iron to do it; I should say that solutions carrying the copper mineral in solution could have come from an indefinite distance, because of the topography above it. The grade rises above the point where Mr. Barker took this sample; and going upgrade there is one producing mine not very far away, but the others would be half a mile away. Exhibit 94 [1112] is distinctly country rock; it has all of the parts to make a rock of it, and it is no part of a vein; it is not vein material. When I speak of the presence of the ferro-magnesian minerals in exhibits 75, 76 and 94 I have reference to the micas and the hornblende; if they were replaced, they would not be visible; they are all visible. Chrysocolla exists in those portions of the district where it can not have been redissolved, where there has not been solvents to dissolve it; if the solvent is present at the time it should

(Testimony of Frank A. Linforth.)

be formed, it would not be formed,—that solvent is the iron sulphate solutions. The presence of chrysocolla in exhibits 94 and 75 is due to a recent deposit, from solutions of surface waters running downward through the partly oxidized portions of the granite. Defendants' Exhibit 77, said to have been taken from shaft No. 1 I should say that it is composed of aplite, so identified by the lack of ferro-magnesian constituents; quartz and feldspar are visible; that makes aplite; there is some iron oxide; a part of the iron oxide is limonite, and a part of the iron oxide is hematite, the difference being that one has a little more water combined with it than the other; they are both similar to the rust that might occur on an iron fence. Defendants' Exhibit 56, introduced as from the same shaft is a piece of rock composed essentially of quartz and feldspar, with a very little of the ferro-magnesian constituent, making it more silicious phase of granite; the piece you hand me would be similarly described, with the addition of a little of the iron oxide, hematite; the fact that exhibits 56 and 77 may have come from shaft No. 1, does not indicate a vein; it is not vein material; it was deposited, or had its origin, from the solidification of the original rock; vein matter must be deposited after the [1113] original rock. That is aplite, a country rock. I would say these exhibits are not vein material because the iron stains at the surface are prevalent on the granite or aplite. They can be found anywhere, and have no connection with the veins. The material in Defendants' Exhibit 96 is

(Testimony of Frank A. Linforth.)

very much altered and there is a remnant of the feldspar of a rock and the quartz of a rock can be seen with a glass, but it cannot be distinctly identified as granite or aplite. The fact that it contains quartz and feldspar,—may be either a granite or an aplite, with the ferro-magnesian constituents of the granite gone, because the material is very badly altered. The whiter, softer portions of the piece I now hold are similar to the material that we find throughout Butte in the outcrops of the faults; where a fault, or a fault vein, is seen at the surface, this material, exactly, is frequently seen; it has not vein material, because there is no vein quartz, no evidence of banding. I would call it highly altered country rock; banding is an arrangement of the parts or constituent minerals in lines and makes a banded formation common to veins. I saw material very similar to exhibit 96 in shaft 21, and generally distributed; this (referring to piece of sample) near to the fault, and this (referring to another piece of sample), in between it. Defendants' Exhibit 100, said to have been taken from shaft 19, is evidently altered country rock, either granite or aplite, as similar to the other sample, because there is the feldspar and quartz of the country rock still in the piece; some of the whole material that makes the outcrop of a fault can be seen in this piece (referring to piece of sample) and, with regard to this piece (referring to another piece of sample), I saw none of that, in that shaft, except in the wash. In the wash, [1114] this material could

(Testimony of Frank A. Linforth.)

be found. It is more silicious than those parts (referring to pieces of sample). The piece I saw in the wash is the largest piece of exhibit 100, and no material of this sort came to my observation in the bottom of that shaft. It could be seen occasionally in the wash, but not in place. The white portion of exhibit 100 I now hold is evidence of the nearness of a fault.

Cross-examination.

(By General NOLAN.)

The WITNESS.—I have been a practicing geologist for five years, and my position is that of assistant geologist for the Anaconda Company; I am an assistant to Mr. Sales, and am twenty-six years old; before coming to Butte I had some experience practicing geology in California, for a period of six months before graduation, and for a period of six months after graduation, at which time I had to do with some pyrite deposits,—iron sulphide deposits; iron sulphate is the oxidized product of iron sulphide, formed from the sulphide by the addition of oxygen; the component elements of the sulphide are iron and sulphur. In the sulphide, you have iron and sulphur, and in the sulphate iron, sulphur and oxygen, and wherever you have iron sulphide, if there is access to it by the atmosphere or by water, you have the sulphate,—the change to the sulphate; the water will not suffice to oxidize the sulphide beneath the surface, but it will on the surface or near the surface; because the oxygen of the water is not free to combine; the oxygen of the air is free to com-

(Testimony of Frank A. Linforth.)

bine; in the air you have oxygen and nitrogen, and in the water you have oxygen and hydrogen. The oxygen of [1115] the air is not combined with nitrogen; it is a physical mixture, not chemically combined; the oxygen of water is chemically combined with hydrogen; in the case of the air there is not any chemical combination at all; they are simply parts, but physically they retain their original properties, in the case of nitrogen and oxygen; in the case of the water, the hydrogen ceases to retain its original properties, and there is a chemical combination with the oxygen; water, by itself, in no instance would operate as a solvent to change the sulphide to a sulphate; the water could be the solvent for an oxidizing agent, and the oxidizing agent operates to change the sulphide to a sulphate, and if it is an agent in the performance of that function, it necessarily is an agent in the changing of the sulphide to the sulphate, but the water is not the agent,—it is an actor; it is merely the carrier of the oxidizing agent; the oxygen of the air changes the sulphide to the sulphate and then the water takes up the sulphate and distributes it. Vein material is such material as is carried into an opening, a fissure or cavity, subsequent to the formation of that fissure, carried in by a chemical process,—deposited, by a chemical process; that is to say, there is some material that is carried there and suffers chemical changes; that makes vein material, carried from the original source of mineralization,—usually unknown depths; in many cases the vein filling came from an unknown

(Testimony of Frank A. Linforth.)

depth. In many cases, as a matter of fact, the fissure itself was simply a line of cleavage, through which mineralizing agencies were permitted to move, and those affecting the country rock changed its material, and that, in some instances, is vein material; in the case of vein filling, where you have ten or twelve feet of material between the walls, in many cases [1116] came from unknown depths, and some of it has been the result of downward enrichment within the walls of the vein. You do not now find any of the fissures in this district unfilled; the large veins at present, must have been composed originally of a number of small fissures which remained empty until filled; the large fissures must be parallel because it is too difficult to conceive of a fissure or crack, the extent, for instance, of the Anaconda vein, remaining open in the ground long enough to be entirely filled by the deposit from incoming solutions; the crack is too big and the time required to fill it is too long, to conceive of such an opening remaining open. We do not know the exact length of time, but small cracks and fissures, connected with one another by smaller cracks, are certainly filled in a shorter time than one large one. The time of filling a fissure is entirely relative; it takes longer to fill a big fissure than it does a small one, and the exact length of time is an unknown quantity. The fissure will cave, fall in from the sides, fill up with material dropping in from the surface and the sides, before the mineralizing agent can have filled it; in order to produce the wide vein, the

(Testimony of Frank A. Linforth.)

small lenses of country rock between the small fissures are gradually eaten out and replaced, so that in the fullness of time all of that granite is completely changed to the same material that started the filling of the little fissures; so you get a big wide vein from the mineralization of a number of small parallel fissures, and obviates the necessity of keeping an enormous fissure open for an indefinite length of time; that is the formation of large veins. The material between the small fissures is the original country rock; it is changed so that it looks like the other, and it is the same as the other. I cannot tell [1117] that the vein filling, so called, was not originally the country rock, and the boundary of the little fissure, and that the boundary was not really the vein filling, when it is all one thing now; there are places where the replacement of the granite is not yet complete, or has not been completed, and I can see the portions of the granite unattacked, resulting in a horse of granite in the vein; that is an observable fact, which strengthens the theory, makes it more probable; in case of a copper vein the filling is quartz, iron sulphide, and various sulphides of copper; quartz should be spoken of as a mineral, not as a rock; rock is a combination of minerals; quartz is a mineral; in the case of a copper vein filling, there is quartz, distinctively such, without any other combination, and these copper minerals, the sulphide,—those are vein filling materials. In the pieces that were shown me here I found quartz only associated with other minerals, making thereby a rock; in the

(Testimony of Frank A. Linforth.)

case of a copper vein filling you find the quartz without being associated with any other mineral, so as to make it a rock, and then this copper sulphide,—it is not associated with any other mineral so as to make it rock. Defendants' Exhibit 103 is largely chrysocolla, carried in the parts of aplite; if it were fresh and unaltered by this addition, you would see only quartz and feldspar, probably, and that would be the material that you would find over there anywhere, mineralized by those descending solutions, this copper silicate, which would be chrysocolla; the chrysocolla over there, or anywhere, is not removed from the veins, it is removed from the original accessory particles of chalcopyrite in the granite; I would not call that vein material; it is the copper material, carried into the parts of some country rock,—I believe aplite; one [1118] piece seems to be more granite; I do not think I would consider 103 vein material, for the reason that I can still see the association of minerals which make up aplite in some of these pieces, and the association of minerals which make up more silicious granite in another piece. If the material exhibited to me gives any evidence of the possession of mica or hornblende, it does not make any difference how much it is mineralized, it would not be vein material in my judgment,—it would not be replacement; in order to constitute vein material, there must be an absence of mica and hornblende; if I saw that in a fissure, mineralized as it is, I would say it was some part of the country rock in the vein, which had been stained; I would

(Testimony of Frank A. Linforth.)

not call that the vein material. I would say that material would go six per cent in copper. If I, as a geologist or mining engineer, saw a vein two or three feet wide, or a fissure, filled with that material, I would not locate it; as an ordinary prospector, finding that kind of material in a fissure, bearing copper to an extent of six per cent, I would think it looked like a vein, and I would probably endeavor to locate right on it, but I do not think I would as a mining geologist. Defendants' Exhibit 102 is either granite or aplite, carrying chrysocolla, in accordance with the statements made previously; there is a difference between 102 and 103 in this respect, that there are pieces here which are pure chrysocolla right through; that piece (referring to one piece of sample), is all chrysocolla, and these pieces (referring to other pieces of sample), could have some and might have come out of a vein, or out of a mineralized joint plane, but the most of the sample is stained country rock; some portions of it are solid chrysocolla, all [1119] one piece; those may have come out of a vein; I am speaking of some of the sample of 102; the material chrysocolla in sample 103, is finely disseminated through the granite, painted into the feldspars. There is a solid chunk of chrysocolla (referring to spot on piece of sample). It is not a disseminated piece in the parts of the country rock, although portions of 102 are similar to 103, namely, disseminated portions through the country rock. A piece of chrysocolla the dimensions of which you speak, that I have been referring to, must have had

(Testimony of Frank A. Linforth.)

an opening that large to be deposited in; you might find such an opening in the case of joint planes; the pieces of chrysocolla in 102 and 103 are the same provided you realize the greater quantity of large pieces of chrysocolla in 102. Granite is composed of quartz, feldspar and mica; quartz itself has an existence independent of the quartz in combination that you find in granite and aplite; this quartz comes up in solution from unknown depths,—the quartz of a vein filling; that sort of quartz had its origin entirely different from the quartz of the country rock, and that is the quartz I speak of as constituting the vein filling; in the veins here you don't have granite as vein filling, altered; you have granite as a horse in the vein, not vein filling; the vein filling is carried in subsequent to the fissure; the granite in the vein is a horse; sometimes this vein filling has completely removed the horse; granite may be fissure filling, if it fills the hole that the fissure made; if there was a crack, aplite would be the filling; it would not be the vein filling. By theory, I believe this ascending mineral agency took this filling of the fissure that was granite or aplite, and changed it into ore, and when that occurs we have vein filling, mineral vein filling, not constituting [1120] quartz, sent from below, but the country rock altered by the action of the ascending agencies, that would then constitute vein filling, and not a horse after it has been changed to ore. Ore is a commercial term; it is mineral matter sufficient as to quantity and quality to be mined at a profit. I

(Testimony of Frank A. Linforth.)

made a pretty exhaustive examination of this ground in controversy, and the ground in the near vicinity; the percentage of quartz or silica in the aplite is greater than in the granite, but I don't know how much greater; the proportion of the aplite to the granite in that district is greater than the district on the hill; over there aplite is in the way of an intrusion into the granite; almost every hole out there shows some aplite; the proportion of aplite to granite, as seen in that unit of area, is certainly greater than the proportion of aplite to granite seen in any equal area in the Butte district on the west side; that is not a matter of figures, it is a matter of absolute observation; there is no way of obtaining figures; I know though, that almost every opening there shows some aplite, and in an equal area, holes dug on the Butte hill rarely show aplite; this chrysocolla over there, in the condition in which it exists, as contradistinguished from the Butte hill, is due to the amount of silica over there,—by silica I have reference to quartz; I say the amount of aplite is greater over there, because I can see a great deal more per unit of area. That is the reason I start from an observable fact. If the aplite contains a little mica, which it sometimes does, there will be a little iron in the mica, but the quantity of iron in aplite is negligible, and the amount of iron in the mica is small, so that one may say the iron found in aplite is negligible; in the case of aplite, you have quartz and feldspar.

[1121] There is no hornblende in the aplite;

(Testimony of Frank A. Linforth.)

the presence of hornblende, together with the constituents of aplite, would make it a granite; if you had hornblende or mica, you must naturally get less silica; to make granite you have to have three minerals; any combination of quartz, feldspar and hornblende or mica is granite, regardless of the percentage of silica; you could not have as high a percentage of quartz as aplite in granite, because you have got the hornblende in the granite, and you have not got it in the aplite,—reducing the quantity of quartz by the proportion of mica and hornblende that you get into it; the quantity of mica in granite may vary; and likewise as to hornblende, mica and hornblende are complex compounds of iron; and we have magnesium, calcium, the parts of the silicate, namely, silica and oxygen, resulting in a complex formula. Quartz is the name given to the mineral, the naturally occurring mineral; silica is the chemical name, the material of which quartz is composed; quartz is silicon and oxygen; in the laboratory that combination is known as silica, when found in nature it is called quartz; they are the same material, chemically speaking and otherwise; the terms silica and quartz may be used interchangeably; in silica or quartz you have no iron at all. The accessory minerals to granite are chalcopryite, iron pyrite and many others, but to very small extent; the chalcopryite and the iron pyrite are accessory minerals and exist to only a very limited extent; they are not essential in the granite. Iron pyrite came as a result of the change in the

(Testimony of Frank A. Linforth.)

mica, and it is also in there as an accessory, and independent of the mica. The micas do not change much in oxidation; the point is too complex to be affected much by oxidation; the change that occurs in the case of the oxidation [1122] of the granite is chiefly the softening of the feldspar, namely, the kaolinization process; that is the extent of the oxidation process for granite, with the exception of its physical disintegration; you have the mica practically remaining the same, and you have the feldspar being softened so as to practically be changed into earthy substances; we have some chalcopyrite in the granite to a very limited extent,—mere pin-head specks in large chunks; the elements of chalcopyrite are iron, copper and sulphur, in combination chemically, and in the oxidation process this chalcopyrite becomes iron sulphate and copper sulphate, and the copper sulphate becomes copper silicate; it is absorbed by the earthy part of the granite, and is precipitated as copper silicate within the pores of the earthy part of the granite; it fills the pores within the feldspar, and that is all the change that takes place; the mica remains the same as usual; the staining of the aplite is effected in the same manner, in so far as there is feldspar there to absorb these solutions; a lot of the staining on the aplite is on the surfaces of the blocks, which precipitation comes from the silica of the aplite; generally speaking, the staining of the aplite is accomplished by the same formula that it is in the granite; that is to say, the feldspar is kaolinized through oxidation, this chal-

(Testimony of Frank A. Linforth.)

copyrite is resolved into a copper sulphate, this copper sulphate is carried by water, is absorbed by the aplite and is deposited in the pores of this earthy matter representing the feldspar, and where a process of that kind is carried on, and especially where this staining is accomplished through this copper sulphate, the copper coming from the chalcopyrite, I would expect in every instance the mica and the granite to remain unaltered; there is no agent there to affect [1123] it; I have seen granite where the mica was removed by the alteration; the factor of the removal of the mica or in the alteration of it so that it is no longer visible is replacement processes, which are by the agency of ascending vapors and solutions which may be of very complex form. There may be various strong acids present and the evidence is that there are strong acids present, which can attack these micas; I think that in every instance where a piece of granite is shown me here, that is mineralized with copper, and where the mica is removed, that granite, in my judgment, has been subjected to the action of ascending solutions and vapors; the portions of those pieces which were granite still have mica; the portions which were aplite never had any mica; this is mica (referring to material on piece of sample). I believe the other piece is aplite; I can see the association of quartz and feldspar yet; this chalcopyrite existing in the granite in small quantities, was a constituent of the granite at its formation; this chrysocolla staining is due to the gathering up of this chalcopyrite in the gran-

(Testimony of Frank A. Linforth.)

ite; over there, probably at one time there must have been about five hundred feet in depth of granite that has been subjected to erosion and thus was produced this staining material, and the existence of chrysocolla over there is due to the fact that there was not sufficient iron to take it up. The erosion may not have been as great on this side of the hill,—at any rate there was more granite up there; the distribution of the chalcopryite is not general; it is only an accessory to granite, not essential, and occurs in some portions of granite to a far greater extent than in others; there may be many places up here where it does not exist, but the granite over there is of such a character [1124] that it has chalcopryite and as an accessory; by reason of the excessive quantity of silica over there, as compared with the lesser quantity of silica on the Butte hill, we have this chalcopryite turned into copper silicate, and if, instead of having so much silica over there, we had less of it and more granite, there would not be this deposit of chrysocolla, because the proportion of iron would be greater then; that is the explanation I gave for it a week ago Saturday; that the erosion over there must have affected a reduction of the elevation about five hundred feet is a matter that has been computed from the amount of wash that can be measured down in the workings of adjacent mines, and it is only a matter of estimation, figured as nearly as possible; it is a figure decided on by several estimators; the amount is the guide from which the figuring is done; as to the copper in the granite, in this Butte district

(Testimony of Frank A. Linforth.)

the country rock granite contains copper as an accessory mineral,—chalcopyrite, and in this district you will get a trace of copper from almost any sample taken; a trace is an assayer's term for an amount too small to weigh,—it would be considerably less than half of one per cent; one-hundredth of one per cent copper will stain so that it can be seen,—that would be a trace; two-hundredths of a per cent,—that is, a hundredths of a per cent is the smallest assayer's endeavor to get, and anything below that would be termed by them as a trace.

Chrysocolla is what I characterized as silicate of copper; the sulphate of copper is a compound of copper, sulphur and oxygen; the silicate of copper is a compound of copper, silicon and oxygen; further, being sulphate, it is extremely soluble; the silicate is only soluble in certain solutions; we have the copper, and the sulphur and the oxygen as sulphate of copper; [1125] that is impregnated in the water and is carried along and then it goes into the body of aplite, and the next we know of it, the sulphur is removed and the silicon takes its place, and it becomes silicate of copper; the sulphate that you asked about combines with that iron, giving the iron sulphate solution. There is not enough silicon in granite to use up the sulphate in this territory over there in the places where the impregnation has taken place, which is also true out here where the sample was taken from that I was examining this morning; if instead of the aplite being there, there was granite, this chrysocolla would be in evidence, of course, be-

(Testimony of Frank A. Linforth.)

cause you have got silica free in the granite, when the granite kaolinizes you have got some silica there; it would surely be in the granite; you have got a little silica in the granite itself, when it kaolinizes; whether it is granite, or whether it is aplite, we are likely to have the chrysocolla where there is erosion, or disintegration of granite enough, furnishing chalcopyrite enough to give it to us; how the cuprite comes into existence as a separate element from the chrysocolla is a matter of chemistry; the chrysocolla is the more complex compound, formed by whatever elements are present to form it, and some of the elements come out; there is not enough to go around, in the case of chrysocolla, so you get as a simpler compound of the balance of the elements left, you might say what material there is left, to give you the oxide, which is a simpler compound than the chrysocolla; there is the copper and the silicon and the oxygen; they are so numerous that sometimes you are not able to get them all together, and when some of them are absent, this cuprite comes into place; when we have cuprite instead of chrysocolla the oxygen [1126] is left out. The silicate acts on the copper, and if there is any copper left over, you have already got a little extra oxygen from the sulphate part. There is oxygen in the sulphate that will act on the copper, if there is any left over, and give you the oxide; it is a matter of chemical balance, depending on the quantity of elements present. In the case of ascending mineralizing agency, the absent element would be the oxygen; you would have the

(Testimony of Frank A. Linforth.)

copper, and the silicon coming up, but you would be without the oxygen, the oxygen must be supplied from the surface, or from such solutions as can be carried down from the surface; the mineralizing copper agency may deposit chalcopyrite in the vein; going back again to the fissure and to the mineralizing agency in the fissure, the enrichment of the material by chrysocolla was of later date than the enrichment of the vein material in the fissure, because chrysocolla is a known product after the oxidation of the sulphides; the sulphides have to be oxidized to give you something that would be in solution again; then you get chrysocolla; we have this chalcopyrite in the granite in its make up, and we have this eroding process going on, and as a result of the eroding process, and as a result of the disintegration of the granite, we have the material to stain the rock as chrysocolla, and all of that may take place absolutely indifferent to what may be taking place in the fissure; the chrysocolla in the granite is of a later date than the sulphides in the granite; so is the chrysocolla in a vein of a later date than the sulphides in the vein. We can develop this chrysocolla without any reference to a vein fissure at all; the same process may go on in the vein; we can develop this chrysocolla by the oxidation that takes place and the wearing away of the granite so as to give enough of this [1127] chalcopyrite to develop a supply of this sulphide of copper; we can get that in the granite, without regard to any fissure at all; this cracking—the fissure in granite bodies takes place, necessarily,

(Testimony of Frank A. Linforth.)

after the cooling of the granite, and takes place after the formation of this body of granite containing this chalcopyrite, that matter through erosion gives this chrysocolla, and this mineralizing substance to fill the fissure came as soon as the crack was opened, allowing it to come up; there is always, as I conceive it, in the subterranean portions of the earth, material that is seeking an escape, and this material when deposited in the crack, is vein-filling matter. Fault fissures are very frequently mineralized in that way, from ascending solutions, and they all will be if there is material ready to escape, as it is in most cases. Aside from the mineralization the gangue is different in that the fault fissure has been produced by a big movement, which has crushed up the granite or the rock through which the fault passes, and the crushed material altered to soft clay spoken of as talc may be considered as a part of the vein; you sometimes find that material in veins; when that material occurs in veins, as it does in fault fissures, there must be a rubbing likewise in the vein, so as to cause that. I remember speaking this morning about this vein material having a banded structure; to some extent you could always find that banded structure in a vein; you will find lines indicating banding, either far separated or close together; you will find them somewhere in the vein; and taking out any piece of the material, it did not make any difference where I found it, I would expect to find in that piece of material the evidence of this banding, carried as far as the arrangement of the parts of the mate-

(Testimony of Frank A. Linforth.)

rial under examination. [1128] I also recognize the fact of mineralization as it is a fact in this district, that the walls of the fissure became impregnated with this mineralizing agency themselves, and that the copper solutions changed the structure so as to bring about what is known as a replacement; a replacement of the character you are referring to, where the walls themselves have become ore, just the same as the vein filling, and some distance beyond the walls into the country rock, would only happen if you had your fissure so broken out into the walls that the ascending solutions can get into them at the time that the vein is being mineralized; it would require a part of the fissure itself, breaking off from the main fissure and extending into the granite, to give you enough access to that; the whole side of the country has settled, whatever may have been the cause of it, forming a fissure, and when that occurs there would be a shaking up of the granite so as to reduce it into that condition where it would be available to disseminate this ascending fluid, but only within the walls of the vein; that would not be true outside the walls of the vein; slips affect the walls at a period long after the mineralization. The walls are usually impervious to this mineralizing fluid; if there is no crack to get the solutions out there, large enough to get them out, the walls are impervious. In some instances here in Butte in those large leads, you get beyond the walls a distance of ten or twelve or fifteen feet and find material so richly mineralized that it becomes commercial ore, because from the

(Testimony of Frank A. Linforth.)

fissure in which the mining was being done, before they went into the walls, there are fissures branching off and traceable right out into the walls, that you can see in the ground; that is the reason that that condition exists. The south wall of the [1129] Mullins vein is one of the impervious walls that I speak of. There is a mineralized joint plane extending from the Hornet discovery shaft towards the north, but I have no idea how far that extends to the north. Mineralization of the joint planes is from the surface waters, the same as the discoloration of the granite; a joint plane contiguous to the walls of a lead might have a little mineralization in it, but the walls of a joint plane are also impervious. If you had some kind of an opening for the deposit of this material, it would be impossible for this coloring matter, this chrysocolla, to disburse itself generally through the granite; it does not require the cracks necessarily; the granite is sufficiently porous to allow the solutions, without the aid of the joint planes; you evade pursuit of that granite when you get to the oxidized zone, separated from it by a plane wall; you get the granite, of course, contiguous to the vein, but the wall of the vein is a plane there, it is granite and is within the oxidizing zone, and the feldspar is affected and makes the granite porous; there is a difference between the actual boundary of that vein and the granite; when there has been the least little bit of movement, you get some clay there, that solutions don't go through; it is impervious; and you can get this coloring matter through the cracks in the

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granite; you can get some of this material because granite is porous and so is aplite, but granite is more so; you can see this coloring matter a little more plainly where the country rock is granite than where it is aplite; the iron does not have to be in a particular piece of granite that is colored by any means; you have a supply of it at some distance possibly; it is the solution of iron reaching the chrysocolla, that dissolves it out; the iron is not necessary [1130] in the piece stained; you have the feldspar changed in the aplite just the same as in the granite, and you have it in the porous condition that you have in the granite; this iron coming along will dissolve the chrysocolla wherever it is, if there is enough iron to do it, but by reason of the dispersion of the aplite over there in the neighborhood of this ground in controversy, as compared with the granite, you have not this supply of iron available so as to do away with this coloring. Vein matter must be quartz and the minerals,—that is, copper and sulphur, iron pyrite,—the compounds of the metals and quartz, and this quartz that I speak of is not the quartz that we get from the granite through metamorphosis, or from the aplite, but it is the quartz that comes up from below,—silicon pure and simple; I may see the oxidized products of some of these minerals, which would be considered vein matter; the oxidized product of quartz would be quartz; there would not be any change there; the oxidized product of the chalcopyrite I have given you; we would find copper sulphide if we went down deep enough, but in the oxi-

(Testimony of Frank A. Linforth.)

dized zone, there would be oxide of copper, that would be cuprite, and possibly the silicate of copper; copper, in combination with iron and sulphur would be copper pyrite or chalcopyrite; there would be no combination of copper and iron. I find chalcopyrite there so that I would be able to recognize it as a mineral; that is found in the sulphide zone; it is changed to its oxidized product; the vein would not have to have quartz in it to be a mineral vein; if the quartz is a mineral occurring in veins, but it would not always be present in every vein; I do not mean that all those things must be present to make it a vein; those are things that will be present in a vein; if you have a mineral [1131] vein where you have the granite altered and mineralized, I should call it granite within the vein; it is a horse in the vein, and where I found material of that kind in a fissure, no matter how much mineralized it was, I would not call it a vein if I could still see the texture of the country rock. There was no replacement in the granite adjacent to the Mullins vein. It makes no difference how highly mineralized this material is, extending from the Hornet discovery shaft to the Mullins vein, I would not call it vein matter,—it is plain country rock; it might be ore, but it is not a vein.

In the westerly shafts, 19 and 21, there is a fissure, running north and south; I would not make any statement about it being the same fissure that goes through the two shafts; the distance is too great to project those fissures across; if it did pursue that regularity of strike, the fault slips and the fault fissures in No.

(Testimony of Frank A. Linforth.)

19 would not hit 21 at all; in the case of faults we also have a displacement of them by other faults, as we have a displacement of veins by faults, and a fault that would displace the fault that we observed in either one of those shafts would be a fault whose strike was easterly and westerly; east and west is a definite direction, and easterly and westerly may vary through a number of degrees; there is no quartz in those shafts; the granite between the two faults is kaolinized and altered, but it is nevertheless granite, however. The mica can be seen in some parts; the alteration has gone on to a considerable extent, but you can still see a little of the mica; oxygen has effected this alteration; talc is the observable thing in the shafts with reference to the fault,—that is what identifies the fault; talc is spoken of as crushed silica,— [1132] is the crushed material, whatever it may be, through which the fault passes; it is merely the ground up pulverized material occasioned by the slipping of one portion of the earth upon the other. The granite in the walls of both these shafts has a little iron rust on it; there is nothing else of a mineral character in the material; there is no evidence of copper. Some portions of exhibit 82 are aplite,—the material I now indicate, which would be the material removed from the brown stained portion of the rock, and might have come from a vein, and a considerable portion of this is aplite, and the remaining portion as I see it here, is quartz and chrysocolla, which might possibly have come from a vein; if there was a small joint plane of fissure in the aplite, that

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may be partly from the aplite and partly from the fissure; I think a portion of it would constitute the banding plane of a fissure, or, in other words, would be the wall; there is evidence of cleavage there between the country rock, a line through there; it may come down through this way (indicating on sample) on this part; it does not have to go through the rock; a piece of that sort must be seen in its environment; this material might be seen in a vein; I would fix the line of separation between the vein matter and the country rock at the edge of the brown; the vein matter is pretty well welded there to the country rock, and the country rock welded into the vein matter; it is offered as a possibility; this material could occur in a vein; it is quartz and that particular chrysocolla may have come from a vein; I see patches of quartz in the sample, but the crystals are too small to see without a microscopic examination; those are collections of crystals of quartz (referring to sample). [1133] I cannot tell from any examination I can make here whether those crystals interlace or are dependent upon each other.

This exhibit No. 78 is a piece of granite, but is a rather silicious phase of granite,—that is, there is some mica or hornblende present which does not allow it to be pure aplite; it contains quartz, feldspar and a little of the dark minerals which make granite; it is just like the ordinary granite that you find on the surface in the country rock anywhere, and I do not think it has been subjected to any altering influences; the iron stain on there is not an altering in-

(Testimony of Frank A. Linforth.)

fluence; it is just a rust on the surfaces. Exhibit No. 79 is aplite with a little greater development of the quartz, namely a little more silicious aplite than normal aplite would be, for it does contain some of the feldspar; it is composed of quartz and feldspar; it is aplite; I see no evidence of the attack of mineralizing solutions; I do not think the present condition of sample 78 is due to the fact that mineralizing solutions have attacked it. Sample 81 is a piece of almost normal aplite; sample No. 79 is aplite of a more silicious phase, and not so much aplite as that; this is composed of quartz and feldspar; referring especially to Nos. 79 and 81, but the quartz in this aplite showing is a little greater in amount; it is nevertheless aplite. (Witness refers to various portions of sample.) These conditions existed as the result of the original formation of the material; some places have had a little more quartz in them, some a little less; that is to say, in the case of 79, when the aplite was first formed, it was formed in that way, and in the case of tunnel No. 31, that would be the northerly tunnel, and there was evidence there in the north cross-cut, of two leads; they bear evidence of fissure leads; the smaller one [1134] is about four inches, and it is a fissure vein; I consider it a small true fissure vein, mineralized by ascending solutions; those two fissures travel easterly and westerly, so far as you can see them; it is quite possible that they would go west four or five hundred feet, and it is quite within the range of possibility that they may extend beyond the limits of the ground in controversy; and

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in the absence of faults, leads like that generally pursue their course with a certain degree of regularity, and if there were not any faults in existence to deflect them in their course, I would expect those two leads to continue in their course for some distance; and the same would be true of their course westerly; if there was faulting the amount of the throw can be any amount; when you have faulting, if you get both parts of the vein, you know how much it has been thrown; the displacement along the fault would exist throughout the whole territory to the surface; one fault might, on its dip, join with another; in the neighborhood of these leads there is evidence of the fact that descending waters have made themselves felt there in the staining of the country rock; the vein itself lies on the side of an aplite dyke, and that aplite is a little stained by the process which you mentioned. The chrysocolla, which is the product after oxidation of the original mineralization of the vein, is the filling in those two leads encountered in that tunnel; I do not recollect vein quartz in that particular fissure; it does not require the presence of quartz to make it a vein. In this case the vein filling is chrysocolla, and there may be a little of the iron oxide there; there is no altered granite within the vein. I took the dip of the two veins at the place where they are exposed, and they are different by a few degrees; their [1135] difference is such that if continued, ultimately those two leads would come together, but the assumption is something that can hardly be taken, because the dips of

(Testimony of Frank A. Linforth.)

veins may change very readily through several degrees, and to project downward from where they are exposed, would be simply a guess as to where they would come together; each one has its well-defined foot and hanging wall, and the more southerly of the two leads you find eastward in the tunnel for a short distance, and generally speaking it has the same strike over there that it has in the cross-cut, and through the faulting system that occurs in that neighborhood there is a disappearance of the lead,—you do not find it easterly of that; that is the way it appears to me as a geologist and mining engineer. I do not find any evidence of that lead, as it is exposed in the cross-cut and the tunnel there, in any other portion of the ground, or in any of the cuts and excavations; I find no evidence in any opening in the northerly portion of the ground, of a vein of any kind; in the openings I only found such quartz as is associated intimately with the feldspar, thereby constituting a part of aplite; no vein quartz was discovered. The material of exhibit 77 is aplite; I can see clearly the feldspars and the quartz but there is with it the rust, the surface oxidation, part of which is the limonite, and part of it the hematite; the darker is possibly the hematite; the light stuff is the limonite and the dark stuff is the hematite, referring to the brown minerals; the essential composition of the piece is quartz and feldspar, rather quartzzy. I did not find any evidence of a lead in shafts Nos. 1 and 2, or in shaft No. 9; the small mineralized slip in shaft No. 9 is a mineralized joint plane; I make a distinction between a

(Testimony of Frank A. Linforth.)

slip and a fault; a joint plane is related [1136] to a slip; if there has been a movement among the blocks of granite along the joint planes, the joint planes are slips. Shaft No. 9 is the timbered shaft. Joint planes are directly related to the size of the granite blocks, which is limited; I have seen those joint planes fifty feet long; I have never seen them longer than that, although they may exist a little longer than that, and on that assumption, that would define the length of a slip; the slip is simply a movement in the joint planes; the joint planes intersect at various angles. We took one piece of sample from each foot in 31 and 32, wherever the mark happened to come, and if any cuprite occurred it will show in the sample; in that cross-cut, in the joint planes, we find a little of the cuprite.

These samples, representing the material in the cross-cut from the Mullins vein to the Hornet Discovery shaft, were taken a foot apart, and were intended to represent fairly the character of the material between those two points; all of the material in the cross-cut is mineralized, practically just the same as the samples before us; this measurement starts from the tunnel and extends to the shaft; one piece is taken from each foot, thereby representing the material through which the cross-cut has been driven; I put that material in the sacks at the time I obtained it. In the case of exhibit 35, there were six pieces put into the sack, from which these pieces were taken, and I brought them into town; I carried them in my arms, with Mr. Berrien's assistance, in as many sacks

(Testimony of Frank A. Linforth.)

as there have been presented; we came in on the street-car; each little sack was deposited in a big sack; they may not have all been in that sack, but, at any rate, they were all carried in by Mr. Berrien and myself from the ground. We commenced getting these samples, [1137] with exhibit 31, near the Mullins vein, which was taken along the east side of the cross-cut, and some little distance from the bottom of the cross-cut; I had examined the cross-cut previous to taking these samples; cuprite occurs in one place in the cross-cut, in a joint plane, or crack in the cross-cut, close to the Hornet shaft, where the wash is very low, or a line was taken so as to be the same distance below the wash, did not cross that particular seam; that seam was right in the floor of the cross-cut. The piece you hand me from exhibit 31 is granite, and I can see the mica there; and the feldspar has suffered some kaolinization, and this sulphate of copper getting in there, has impregnated the entire mass of kaolinized feldspar, not the entire mass of the granite; there is also quartz in this piece, and we have the feldspars impregnated by the silicate of copper, and you have the mica without suffering any change at all; where you have a complete alteration, and where the mica disappears, and where you have copper mineralization, you would probably have some sulphide compound in the granite in the place of the mica,—very frequently the sulphide of iron; the alteration that has taken place in this piece of granite that is now the subject of discussion, is due entirely to descending waters containing sulphate of copper;

(Testimony of Frank A. Linforth.)

there is no sulphate of copper in the lead at all that I could see; some of this water impregnated with sulphate of copper unquestionably got down into this lead, where there was a better chance for it to move than in the country rock; some of the copper sulphate waters went down through that; if there was an excessive quantity of iron there, the chrysocolla in the vein would have been redissolved and carried farther down the vein; the fact that there is not enough iron in the neighborhood to redissolve that [1138] is why it is there in both cases. In this material before us, having in mind the samples to which you have already referred, there is silicate of copper, and chrysocolla; I found silicate of copper and chrysocolla in the lead, in greater quantity than it presents itself in the sample I submit; in all of the instances here, where the samples were taken for the purpose of showing the material in the cross-cut, they are all granite, and they are all altered to the extent that the feldspar is kaolinized and is impregnated with sulphate of copper, so as to become silicate of copper, but I would not call this lead matter; if I found material like that within the walls of a fissure, as known to me in Butte, I would call it a horse, not vein material, because it is granite. We have assay returns of the piece of ground covered by certain of these samples, and I think the assay returns would fairly average the value of these samples that are on exhibition now. The samples for assay purposes were taken so as to give the copper content of the same piece of ground from which the exhibits were taken. I com-

(Testimony of Frank A. Linforth.)

menced to cut this groove to get the material from which the assay returns were obtained along a line parallel with the line from which I took the exhibits, and close to it, and about the same elevation as the line I adopted for the purpose of getting those samples, at intervals of a foot apart, and in getting the samples for assay purposes, I cut into the body of the material with the pick, and made an irregular line indentation, which in certain places would have a little greater depth and a little greater width; the indentation would probably be about an inch, some places a little more, and in width three or four inches, so as to have the sample fill a sack of the size of the ones you have seen here. I got these [1139] samples that were shown here at a distance of a foot apart, but the sample matter was a continuous cut from where I commenced to where I ended, except where I changed from one side of the cross-cut to the other; in taking the sample, it should be taken, and was taken, along a line, including any material which came across it; there may have been copper oxide in the material I encountered; I did not look to see; I took what came in the line of my sample in order to make a fair estimate of the copper content; certainly no large amount of copper oxide appeared; the pieces taken nearest the Hornet shaft are not quite so heavily impregnated with chrysocolla; the assayer's returns confirm that. Where you encounter a horse in a lead, that may be mineralized so as to constitute ore, but it is still a horse,—the formation of the original fissure has divided the fissure, so that one part

(Testimony of Frank A. Linforth.)

went on one side of the piece of ground, which became the horse, and the other on the other side; that is one way to account for it. That is one occurrence; another method would be that in the formation of the large veins by a number of small parallel fissures, where the ground between the fissures has been replaced completely, to produce vein matter in one of these places has not been attacked or replaced, then you have a horse; wherever I find granite in the lead altered and mineralized so as to constitute ore, I would call it mineralized country rock myself, but the miner would speak of it as a horse; in a great many cases the walls of a lead are clearly defined; in other cases they are defined by assay, or by the amount of material that you can see in them; they, at any rate, can be discovered in all cases. In the case of the walls of a fissure, there is no difficulty about discovering them,—the walls of the crack. When this [1140] mineralization by replacement occurs and extends beyond the walls of the fissure, there is no difficulty in finding the walls of the ore body, but there is a little more difficulty than in the case of perfectly smooth planes, but there is no real difficulty; it is always arrived at; where the mineralization extends beyond the walls of a fissure, it does not always extend the same distance; considering simply the mineralization in so far as it has occurred, enough to make the country rock ore, there is not a marked line there as I encountered in the case of the wall of the fissure, but you can set a line there; the walls of an ore body may sometimes change, as the cost of the treatment may

(Testimony of Frank A. Linforth.)

justify it,—that is, to-day material may be shipped as ore that could not be shipped fifteen years ago; the walls of the ore body will vary with commercial conditions, but the walls of a fissure are not affected in that way, or by any conditions whatever. I should consider it necessary to have some commercial ore to start with in order to justify the location of ground, and the material must be a vein, and in order to be a vein there must be this quartz that I have spoken of coming from beneath, with other characteristics,—the banded formation of the minerals in the vein, the existence of other minerals that are deposited by chemical action,—chrysocolla and cuprite, by the oxidation of the minerals primarily brought in sulphide compounds. If I found a fissure having simply granite, with feldspar kaolinized and impregnated with chrysocolla, I would not consider that such mineralization as would justify me in locating the ground; no matter how richly endowed the granite was with the copper, it would not make a vein of it, and that is the reason I say that this material I found in this cross-cut is not vein material.

[1141] Redirect Examination.

(By Judge BOURQUIN.)

The WITNESS.—Most of the material of exhibit 102 was aplite; there was some parts of it that were large chunks of chrysocolla; now, if a fissure three feet wide contained aplite, even if it were stained, it would still be aplite, and being aplite would be a dyke; it would not be a vein; being a dyke and being stained in that way, I would not expect that staining

(Testimony of Frank A. Linforth.)

to last with any depth at all, nor would I expect that staining to continue the length of the dyke; I would think that I had there a dyke, locally stained, and consequently not a vein giving me a reasonable indication of finding ore. That is what I meant when Colonel Nolan asked me this morning if I had a fissure filled with ore and material like exhibit 102, whether I would locate it. A dyke is an intrusion of one rock into another; aplite commonly occurs in dykes, and in the Butte district it is clearly an intrusion into the granite; there is no commercial ore in the aplite dykes, the dykes themselves are not commercial ore; the veins do cross the aplite and may not be quite so much replacement in the mineralization of the veins where they cross aplite; the vein is a little leaner with regard to copper content at that point of crossing. When granite in veins has been completely replaced, it is vein matter and ceases to be granite; I should say that the granite contained a little more feldspar generally than normal aplite, and in normal aplite you find an excess of silica. In the neighborhood of the ground in controversy the granite is more stained with this chrysocolla than aplite, because the granite in its weathering tends to disintegrate differently from the weathering of aplite; aplite in weathering breaks into small, [1142] roughly rectangular blocks; granite disintegrates into small pieces of the constituent minerals; the decomposition of the feldspar has something to do with the amount of chrysocolla subsequently deposited there; the more feldspar which you have

(Testimony of Frank A. Linforth.)

there, the more kaolinizing effect you will get, and consequently more receptacle for the chrysocolla. I distinguish between different kinds of quartz; one is vein quartz, the other is the quartz of rock; when I said there was no quartz in shafts 19 and 21, I had vein quartz in mind. In speaking of shaft No. 9, being shaft No. 3 on Complainant's Exhibit No. 14, when I answered on cross-examination that there was no vein there and that there was a slip, mineralized, or joint plant, that was observed in the cross-cut which runs north from the shaft, at a depth of twenty-five feet, and occurs at a point about five feet from the shaft timbers; there was no such slip or mineralized plane in the shaft proper; in locating a vein I should expect to have a little commercial ore to start with; if I had a distinct vein structure and the minerals which belonged to a vein, it would be locatable; I think the question was asked, or at least I understood it, on the basis of developing. A miner can locate a vein when he finds it, when there are such indications of ore that if he develops it, it would lead him to believe that he would find commercial ore, if it is enclosed in vein. If a man asked my opinion about developing a vein, I would probably tell him that it would not be worth doing much with, if I could not see certain quantities of commercial ore. I have in mind extensive development, for the purpose of making a mine of it. Veins in Butte, barren at the surface, have proven that they do justify development going to depth, in commercial ore. I observed the fault in the vein in

(Testimony of Frank A. Linforth.)

the [1143] Mullins tunnel; the faults were after the mineralization of the vein; the fault is of a much later date than the original mineralization of the vein, which was by ascending solutions, so that ascending solutions have not affected the fault, and they did not affect the country adjacent to the fault in any respect. My judgment is that the joint crack or plane, on the north side of the Hornet shaft, would not exist to any great distance northerly,—that it would run into some other joint plane and there terminate.

Recross-examination.

(By General NOLAN.)

The WITNESS.—This joint plane might be a fifty foot plane; at the same time it might be five feet; it can be seen more than five feet, possibly ten feet, but not more; it is so narrow anyway that I am not prepared to say whether it lessens or gets greater in width; there is nothing there to suggest to me that it may not go twenty feet farther, except that it is a joint plane; I do not think twenty feet further would reach the hanging-wall of the Mullins fissure; twenty-five feet might possibly reach, if it extended that far; there is nothing to indicate to me that it does not go twenty-five feet, except that it is a joint plane; those ascending solutions occupied some time in coming, but they continued to come until they mineralized the fissure, when they started,—that is to say, we started at the bottom and went up this mineralizing fluid or vapor and, of course, we kept sending it up for some little time, until it got to the sur-

(Testimony of Frank A. Linforth.)

face or the top of the fissure; there is no way of arriving at how fast this mineralizing fluid [1144] or vapor traveled towards the surface; it might have taken thousands and thousands of years to mineralize a fissure, or possibly a million; it depends; the chemical activity that produces these changes depends on a great number of factors,—on the amount of moisture present; in the true fissure and with the true filling, it all comes from below, but it came up in fine particles in solution, and it took some time for them to be exposed into the new place where they are now going to reside, and that was the case with the quartz that came up, or the silicon, in its pure condition; it came up in solution in small particles and then finally these particles got together and we have the quartz in the solidified form in which it is today; and when I speak about the mineral vein, if the commercial ore is not there, then I expect to find this material there, which we are considering as coming up from below; and if we found in this fissure granite kaolinized or aplite with the feldspar reduced to an earthy substance, and chrysocolla in there, that would not be vein material that I would consider favorably; that would be the country rock; there are no dykes in the Butte district being mined; the material in the dykes is not mineralized; a dyke is sometimes loosely referred to by a mining man, when it is a fault fissure, or anything else; I am considering a dyke from a geological standpoint, from which standpoint it is the intrusive rock; it may make its new fissure; the fissure need not have existed there

(Testimony of Frank A. Linforth.)

first; at the time the matter comes up the material might have been contemporaneously brought into existence.

This sample No. 109 contains granite, which looks to me as if it had remained outdoors somewhere, or exposed some place so as to become very rusty; the parts of the granite are still [1145] here; I can see all of them; it also contains a little iron oxide,—the hematite form,—and a little quartz, but several pieces of it have still the granite texture; I do not see the association of this quartz with the feldspar, so I am unable to tell whether that is the quartz that is dissolved from rock rather than the quartz that is sent up from below; there is, of course, quartz of the granite in some of those pieces, which I can see in almost every piece here; that is the only piece that shows any quartz about which there might be a question; material like that in a fissure would have no significance to me; the granitic texture of granite is still present.

Redirect Examination.

(By Judge BOURQUIN.)

The WITNESS.—The faults upon the ground in controversy or upon the Butte and Boston placer are mineralized to a very limited extent, and that extent, the downward, more recent addition of mineralized material. These faults in so far as they intersected the vein in the Hornet tunnel and the tunnel 31 were younger than the veins themselves; I impute their mineralization distinctly to the downward trend of the surface waters, bringing the mineral, in so far

(Testimony of Frank A. Linforth.)

as it has been deposited in the faults, from the same source that the chrysocolla comes from, that is disseminated through the granite, namely, the chalcopyrite in the granite above the fault; in taking the samples which were put in evidence I drew a line at a convenient place to sample and took whatever material came along that line, without any reference whatever to what the material was; the joint plane at the bottom of the Hornet cross-cut, [1146] close to the Hornet shaft, is the only material anywhere exposed that is different in any way from what I presented right here; I did not observe any mineralization of the fault on the east side of the upper cross-cut; there is no mineralization of that fault at that point; it is not now visible in the east side of the Hornet cross-cut; near the vein, towards the west side of the cross-cut, a little of the mineralization has resided in the fault there. I started my sampling and exhibits on the east side at that point; the same fault, mineralized to the same extent, occurs in the lower Hornet drift,—it crosses the Hornet drift; that fault is in the drift, not in the cross-cut; in those cross-cuts from the Hornet tunnel to the shaft I noticed very small nodules of cuprite in the joint plane in the upper cross-cut, right at the bottom of the Hornet shaft, lying almost horizontal, and in the lower one a joint plane terminating against another joint plane before it reaches the bottom, and close to the lower Hornet drift. That is all the cuprite that can be found in either of those workings. In the upper cross-cut, the joint plane containing these

(Testimony of Frank A. Linforth.)

small nodules occasionally of cuprite came below the line of my sampling; it was right on the bottom; my sample was about a foot above the bottom; in the lower cross-cut, the joint plane containing the cuprite terminates on another joint plane, and my sample was taken at a convenient elevation, and past below that; none of that joint plane containing the small nodules of cuprite and excessive chrysocolla fell within the range of my sampling and exhibits; it exists in such a limited extent that it can be considered negligible in the cross-cut; it does not exist there in quantities that would encourage mining; in the Hornet shaft I saw there was a joint plane and joint planes [1147] are of limited extent; it is not a master joint, consequently it is not of the greater length of joint planes, and the majority of joint planes are of short extent; the indication to that extent is that the joint plane would not proceed any distance on its course or dip. I observed the hanging-wall of the Hornet vein in the workings below the Mullins tunnel, and adjacent to the lower cross-cut, and it presents no appearance of being intercepted by this joint plane visible in the Hornet shaft; the wall is unbroken, smooth and definite, and it is in the drift above.

Recross-examination.

(By General NOLAN.)

The WITNESS.—In order to know the length of a joint plane, some mine working must have followed one, and I have no recollection of a drift or a cross-cut following a master joint so that I could tell its

(Testimony of Frank A. Linforth.)

length; I know that it would be a little longer than the small joint planes which terminate against a master joint; I have in mind one case of a joint plane fifty feet in length, but I also have in mind a great many cases where the joint planes are only a few feet in length; from what I saw of this one I could not tell whether it was a few feet or fifty feet; if it were over thirty feet, I think it would reach the Mullins vein; I only have a recollection of one fifty feet long; I have seen a great many master joints,—very possibly a thousand in the course of five years' daily examinations. I remember an occasion when my advice in the Mountain Con directed the running of a drift or cross-cut to a hundred and forty or fifty feet north in hard country rock, and advising [1148] that we would strike a lead, and we struck a vein, but it was not a commercial material; the diamond drill was used at the end of the cross-cut I suggested; I had nothing to do with that. The throw of faults suggested that to me; a vein had been drifted on, was faulted, and I endeavored to find the faulted portion. This little selvage of mineralized material that I say represents a joint plane running north from the Hornet discovery in the cross-cut, is a negligible quantity, because it is a joint plane; the dimensions of a joint plane render it negligible. A small mineralized fissure looks like a vein, even if it is only a mineralized joint plane; in this case, the granite blocks can be seen terminating against it; in the vein, there would be vein material all around it; the material and the mineralization is the same as it would be if

(Testimony of Frank A. Linforth.)

it were in a vein, and the structure in so far as it extends, is the same; provisionally with its length, it is a stringer; in the case of a vein where you encounter those stringers, they run within a few degrees, parallel with the walls of the vein; I never knew of any stringers at right angles to the strike of the lead; they are approximately parallel with the walls of the vein; they must be to lie within the vein. I had examined the cross-cut before I took the samples; I knew after I had taken the samples, that I had taken them at a height above the bottom where this seam existed; if I had taken them along a straight line in accordance with the principles of sampling at the bottom, it would not have been representative of the material. The fact that I took them a foot above the bottom was not based on the fact that the cuprite was in the bottom, except that I was anxious to get representative material; I had made a thorough examination of the cross-cut before I started [1149] to take the samples, and I had satisfied myself from the observation that this cuprite was simply visible at a particular portion of the cross-cut, and I knew at the time I started to take the samples in the line that I marked out that I would not reach that portion. Where this cuprite is, it is filling a joint plane; there is not any likelihood that it is widening of the portions of the joint plane not visible to me. Assuming that is not a joint plane that stringer might possibly grow wider as it extends; that joint plane and one in the lower cross-cut are visible; there are, no doubt, joint planes there, but the dis-

(Testimony of Frank A. Linforth.)

integrated condition of the granite rendered them difficult to see when they are of smaller dimensions; if they were mineralized I would see them; the mere crack through that disintegrated granite would hardly be visible; the more nearly horizontal character would lend a physical possibility of more material remaining there for the purpose of precipitation; the decided mineralization there was of a later date than the mineralization of the fissure, and that the fault there was of decidedly later date than the formation of the fissure,—the vein fissure, but those periods of geologic time are unknown; later on that vein is cut by the fault, not decidedly with reference to a number of years, but a decided fact; time must elapse between for the mineralization of the fissure; from the observations I made at the Vesuvius workings I would not say there was any chance for getting any ore there.

Redirect Examination.

(By Judge BOURQUIN.)

The WITNESS.—This joint in which appeared the nodules of copper and chrysocolla was along the floor in the upper cross-cut, [1150] or entered the floor of the upper cross-cut at some point; if I had wanted to sample to ascertain the value of the material therein, it would be absolutely necessary to sample it across the joint plane, which sample would have been taken vertically; that is the only way that the material in that joint plane could be correctly sampled; several samples might be taken, but they would all have to be vertical samples, and when taken would have no bearing on the material in the cross-

(Testimony of Frank A. Linforth.)

cut; they would merely represent the material of that particular little crack; the total width of the sample would not be over an inch.

Recross-examination.

(By General NOLAN.)

The WITNESS.—If I desired to get an accurate estimate of the sample value for that body of material that is mapped out here, I would take horizontal samples and not vertical; the sample of the little width would only represent the width of that crack; the sample of the little crack would not determine the value of the bodies; if I followed that stringer that would not correctly represent the value of the material in the cross-cut; getting the strip above the stringer would represent a large part of the material in the cross-cut,—the sample would be correct for the ground through which the cross-cut was driven; it would not if, as a matter of fact, two or three feet of the material above was poorer than the the material in the strip, and it would not if the material a foot or two feet below the strip was richer than the material in the strip; [1151] I have samples taken at different elevations, however, in the shaft, to determine that feature; the material in the shaft might be richer or poorer than the material in a body extending twenty-five feet from the shaft to the hanging-wall of the Mullins vein; the sample only represents the ground from which it is taken; my samples were the average of the material exposed.

(Signed by witness before Examiner February 16, 1912.)

[Testimony of Chauncey L. Berrien, for Plaintiff.]

[1152] CHAUNCEY L. BERRIEN, duly called and sworn as a witness on behalf of the complainant, testified as follows:

Direct Examination.

(By Judge BOURQUIN.)

The WITNESS.—My name is Chauncey L. Berrien; I live in Butte, Montana, and am a mining geologist and mine foreman, in the employ of the Anaconda Company; I have been following the occupation of mine geologist for nine years, in Butte and vicinity, Idaho and Montana. I attended Columbia University in New York City from 1899 to 1903; during the summers of those years I worked in the Homestake mine, and through the country in Dakota, and in the summer of 1901 and the summer of 1902, I worked underground in the Butte mines. In December of 1903, I came to Butte and worked underground as a miner until February of 1905. I then went into the geological department of the Amalgamated, under Mr. Winchell, as an assistant geologist and remained there as assistant to Mr. Sales, after Mr. Winchell left; during that time, I had charge of the geological work in the West Colusa, the Leonard, the East Colusa, the Mountain View, the Tramway, the Minnie Healy, the Silver Bow, Berkeley, the Gray Rock, took notes in many other smaller properties through the Butte district, assisted Mr. Sales in taking the geology at the Pitts-mont, assisted Mr. Sales in making examinations and made examinations by myself through the state

(Testimony of Chauncey L. Berrien.)

and through Idaho; the mines I mentioned as having charge of the geological work represent the principal mines of the Butte district; aside from taking the geology in these mines at different times, as new men came to the office, [1153] I took them around to the different mines of which they were taking the geology, and in that way have been in practically every mine of any importance in the district. At Columbia University I occupied myself with mining engineering and geology; after my work in the geological department, I was asked to go to the operating end of the work, and was sent to the Mountain View mine as a foreman, and that position I have held for the last two years, and do at present; for three or four years that has been practically the largest mine in Butte in the matter of output.

Q. In your judgment, has your experience and labors in the Butte district given you a pretty thorough understanding of its geological conditions?

By General NOLAN.—Object to that for the reason that Mr. Berrien is presumably a modest man and that question would embarrass him to answer it.

A. I think I am.

The WITNESS.—I am familiar with the Butte and Boston placer, a part of which is in controversy in this case; I have been acquainted with it since October 10, 1911; at that time I was called to Mr. Kemper's office in regard to doing certain work on the Butte and Boston placer, and at that time he told me of the coming suit, and asked me if I would

(Testimony of Chauncey L. Berrien.)

undertake to look over the ground and, if necessary, to testify, and he asked me at the same time to take someone with me to assist me in doing the work, and I asked Mr. Linforth to go with me. Since then I have made probably ten visits to the property and have examined all the openings upon the placer; I recognize the division of the Butte district into what is termed the east and the west sides; Silver Bow Creek and its extension up [1154] east of Meaderville would be the division line. There is this difference between the two districts: In the main operating district of the west side, the general mass of the country rock is granite, although there are dykes of aplite and quartz porphyry through this mass. On the east side, the aplite exceeds the amount of granite, so far as any openings which have been made are concerned. Aside from that, the oxidized portions of the veins in the western side show a different appearance, and the country rock some slight differences from the country rock on the east side. Other than that, there are no differences whatever. In the mineralization of the eastern portion, which might be considered as the Pittsmont and the Butte and Boston placer veins, the Altona, whatever fissure veins I have seen on that ground are similar to the ones on the western portion of the camp; of course, there is a greater amount, and it is a noticeable fact that the conditions on the surface,—that the green staining on the surface and through the rock is greater on the east side than on the west side. There are larger veins on the west-

(Testimony of Chauncey L. Berrien.)

ern side; whatever veins I have seen on the eastern portion are,—that is, on the Butte and Boston placer,—the greatest width is three or four feet, but at the same time in the Pittsmont are veins of ten or twelve feet in width. I account for the green staining which is more observable in the country rock on the surface of the east side, by the lack of iron on the eastern portion, which was probably due to the greater amount of silica, and as a result of that, there would be less chance for the formation of solvents, which would dissolve this green stain, or which would dissolve the cuprite, which is more abundant on the east side than it is on the west side, and these conditions probably [1155] existed on the western portion, but have become lost through the enormous amount of solutions which would carry away this green staining, or would dissolve the cuprite; this green staining is due to the copper silicate, chrysocolla.

At the time Mr. Kemper called me in in regard to this work, he gave me a blue-print which had been made by the firm of Barker and Wilson and he asked me, aside from looking at the geological conditions, to locate all workings which did not appear on this map, and make maps which would represent the position of these workings on the B. and B. placer, and with Mr. Linforth, we spent several days first in locating all the workings which did not show on this original map, and from these notes I platted and made the maps which are shown as Complainant's Exhibits 14, 15, 16 and 17. They are accurate and

(Testimony of Chauncey L. Berrien.)

represent the relations of the workings and also the geological features on the B. and B. placers. The exhibits themselves were made from the original tracing which I made from the notes. I derived the boundaries of the lode claims as laid down on Complainant's Exhibit 14 from the blue-print which was made by Barker and Wilson. Mr. Kemper furnished me by Mr. Kemper was taken from Defendants' Exhibit 2 in case 9000 in the State District Court, and I was given the testimony in case 9000 to read over; and thinking it the better plan to number the workings on map as closely as possible to the original map in the other case, I numbered them as they are on Complainant's Exhibit 14. I numbered the timbered shaft on Complainant's Exhibit 14 No. 3 because it was so numbered on the map which I had and which was supposed to have been used in the other trial. Comparing Complainant's Exhibit 14 with Defendants' Exhibit 1 in this case, the general outlines of the [1156] lode claims, the placer and the workings, I find they are practically the same, although there are slight differences on each map; on Complainant's Exhibit 14 there is one correction, or two corrections, and one addition which might be added, which did not affect the relative positions of any points in the case,—this cross-cut from the working which has been designated on Defendants' Exhibit 1 as No. 36, and I will number this 36 (witness marks working on map No. 36); it is platted as about north fifteen west, when it should extend north fifteen east. This is a mistake in platting it from my note-

(Testimony of Chauncey L. Berrien.)

book; I have reference to the cross-cut near the face of tunnel 36; the other difference is that shaft 19 is a little *bit east* on Complainant's Exhibit 14 than it is on Defendants' Exhibit No. 1. Now, aside from that, on tunnel No. 30, there is a north cross-cut and a south cross-cut from the tunnel which are not represented on Defendants' Exhibit No. 1. In No. 31, the cross-cut extending to the south is not straight, as indicated on Defendants' Exhibit No. 1, but has a curve in it, so that one is not able to see the face when standing in the tunnel; in other words, I have some workings on my map, Complainant's Exhibit 14, or extensions of workings, that do not appear on Defendants' Exhibit No. 1. And in No. 35, this cross-cut to the north does not show on Defendants' Exhibit No. 1, and on No. 37, there is a working to the east. Now, as far as these points are concerned, I am not projecting them as a correction upon this map, because they do not have any bearing or affect anything in the case so far, except that I want to compare and point out the differences in these two maps.

By Judge BOURQUIN.—We offer these maps in evidence, Complainant's Exhibits 14, 15, 16 and 17.

[1157] The EXAMINER.—They will be received in evidence.

The WITNESS.—These workings on Complainant's Exhibit No. 14, I have marked with the same numbers, the tunnels Nos. 30, 31, 32, 34, 35, 36, and 37, and shafts No. 19 and No. 21 are numbered the same as the relative workings on Defendants' Ex-

(Testimony of Chauncey L. Berrien.)

hibit No. 1. During the different visits I made, I probably visited these workings in some different order, but taking up shaft No. 21,—this shaft is one hundred and ten feet deep, four feet of which is in solid bedrock. The shaft is about six by four and in the bottom the geological facts show nothing but two parts of walls of the continental fault. They have a northwest strike and dip slightly to the east. One wall appears on the west side, and one on the east side. The material between these walls is decomposed, altered, stained country rock. There are no signs of a vein. The only signs showing are some iron oxide stains. Those fault planes are about north five or ten degrees west. I think that is all on No. 21.

Tunnel No. 30 is northeast of shaft No. 21; and is one hundred and twenty-four feet long. Twenty-four feet west of the east face, there is a cross-cut south fourteen feet long. Ten feet from the face, west from the east face, there is a cross-cut twenty-four feet long. In this opening there is no vein whatever. The country rock is largely aplite. Just west of the north cross-cut, there is a small wall of the continental fault; there are, in this aplite, certain conditions which show aplite merging into almost pure silica; there is no vein in these workings. The strike of that plane of the continental fault visible in tunnel 30 is north and south, and dips eighty degrees east and is represented on Complainant's Exhibit 14 by the blue line.

[1158] The next opening east of this is shaft No.

(Testimony of Chauncey L. Berrien.)

1; it is eighteen and a half feet deep at present, nine feet of the upper portion being in wash. The material taken from this opening was granite of which some portions merged slightly into aplite. Through the center of the shaft there is a harder rib of granite, stained slightly more by iron oxide than the other portions of the shaft, but at the same time all through the region of the bedrock, directly under the wash, every seam and crevice in the country rock has a staining of iron oxide, or the iron oxides,—it is limonite and hematite. There is no vein structure whatever in shaft No. 1. In speaking of every seam in the country rock below the wash being stained with iron and iron oxides, I was speaking then of shaft No. 1, but at the same time I have never seen any workings, surface workings which reached bedrock in Butte, that did not show similar conditions to most any of these workings in which there is no vein showing. Another fact is that where a fault is cut near the surface, whether it is mineralized or not, it shows the same conditions, the stained country rock altered and broken; my work in the geological department, a portion of the time, has consisted in opening up the surface in preparation for the Butte and Ballaklava suit, and in that time partly under my direction, we dug many trenches across all the claims of that property, and those adjoining a wall in the country rock is stained with iron oxide and the granite is altered considerably in places. It was never any trouble to recognize any of the main veins through the country exposed. I did not say there was a parallel in ap-

(Testimony of Chauncey L. Berrien.)

pearance in shaft No. 1 and the workings last referred to by me for the Butte and Ballaklava suit,—it has this difference, that this comparison, that the ground in [1159] No. 1 and also the ground in No. 2 is stained similarly to any ground existing between the outcrops of veins in Butte. The seams in shaft No. 1 are fairly numerous; most of them were irregular seams, but one in particular was a hard rib of granite more silicious, and therefore less readily altered,—was northeast, although it is not a vein, still it had a course; these seams would range from a quarter of an inch to an inch; they are merely staining through cracks or joints in the surface rock, which naturally comes in all regions where there is much erosion caused by breaking from freezing or thawing, and all weathering actions. There is no vein or vein structure in shaft No. 1.

Shaft No. 2, directly east of No. 1, is fourteen and a half feet deep. The upper eight feet and a half is in wash; below this, the bedrock consists of aplite and granite. Aplite exists on the northeast portion of the shaft and granite on the southwest. There is a staining of the granite and aplite by iron oxide. Farther than that, there are no features worthy of mention. There is no vein in the shaft No. 2. Aplite appears there as a dyke rock, extending up to the granite,—it is an intrusive aplite.

The granite and aplite, quartz porphyry, are the three main rocks comprising the country rock of Butte. It is mineralized only when a vein extends through it, or that it is in such a position that the

(Testimony of Chauncey L. Berrien.)

veins have extended through it. It is a noticeable fact, not only by people connected with mining in Butte, but by Mr. Weed, and he so states in all of his articles on Butte on that matter, that there is a lessening of copper content as the vein passes through aplite; the reason for that is that aplite is less readily replaced by the mineral solutions [1160] to form ore, than the other country rocks, and the only time at which aplite is mined for ore is when the vein itself passes through an aplite dyke. It has never been mined as a dyke and has no bearing in that way on the vein deposits of Butte,—ore deposits. I heard Mr. Mason testify about a large body of aplite in the Modoc which he said looked like peanut candy. He had reference to a quartz porphyry dyke, and his description resembling peanut candy was very exact, but it is not aplite; it is quartz porphyry, which differs as much from aplite as granite does from quartz porphyry, or any other rock. There is a fine grained ground mass, with phenocrysts of feldspar or quartz porphyry, generally quartz porphyry,—phenocrysts of quartz through this ground mass, that gives it this appearance like peanut candy. This fine grained ground mass with phenocrysts in it is indicative of any porphyry; porphyry is not a rock; it is simply a texture. and this is called quartz porphyry because of the phenocryst of quartz. There is no vein or vein structure in shaft No. 2.

Tunnel 31 is southeast of shaft No. 2. It is about a hundred and ninety feet long. From the opening

(Testimony of Chauncey L. Berrien.)

at the face about eighty feet in, where the tunnel starts in the side of the hill, we encounter the bed-rock. This line of bedrock is represented on Complainant's Exhibit 14 by a slight black line. The bedrock in nearly all the openings on this ground shows a dip of from twenty to thirty degrees westerly; and this wash appears in the top of the first north cross-cut from the tunnel 31; in this cross-cut, probably twenty-four feet from the tunnel north—it is really the second one. There is a small cross-cut near the portal of the tunnel and the cross-cut of which I am speaking is the second north cross-cut; about twenty-four [1161] feet north in this cross-cut, there is a small vein mineralized with chrysocolla, having a strike north eighty east, and a dip eighty degrees to the north; the size of that vein is about a foot or eighteen inches in width; and since this map was made, Complainant's Exhibit 14, this same cross-cut has been driven ahead nine or ten feet and, therefore, does not show on the exhibit, but it extends with a slight trend to the east for ten feet, intersecting in that distance another vein six or eight inches wide, which contains chrysocolla and cuprite, having practically the same dip as the first vein encountered, and the same strike; the other material in this cross-cut consists of aplite and granite; there is a slight staining, very slight, with no great extent, in this cross-cut; the staining is chrysocolla,—copper silicate. The face of that north cross-cut is in granite or country rock. It has gone through the vein; leaving this cross-cut, there is a cross-cut,—we might call it almost in an easterly direction,—and opposite

(Testimony of Chauncey L. Berrien.)

the cross-cut just mentioned, and the material cut through is aplite and granite, with many seams stained with iron oxide; there is no showing of a vein whatever in the south cross-cut. Leaving this cross-cut, and going northeasterly probably twenty-five feet, we encounter the same vein that was in the second north cross-cut. It has a dip of eighty degrees to the north, extends along this tunnel for about twenty feet, and encounters a part of the continental fault, which is vertical, and has a course of north, twenty degrees west. From that point easterly in the workings, the vein is not exposed, due to the throw on the continental fault. The vein has, to my mind, been thrown north. That continental fault on Complainant's Exhibit 17 is indicated by the blue line; the dip is indicated by ninety [1162] degrees and the strike north twenty degrees west; I might extend this second north cross-cut in this exhibit, if you wish it. (Witness makes extension on map.) The second cross-cut is practically north and about ten feet extension. I have made a red line on the extension of the cross-cut laid down by me on Complainant's Exhibit 17, which indicates the second vein in the second north cross-cut. Going easterly in the tunnel, I encountered on the north side of the tunnel the vein I had seen in the north cross-cut, which is the first vein encountered in the second north cross-cut.

Beyond this continental fault shown in tunnel 31, there is no showing of a vein whatever, but near the face there is a small northwest striking fault seam

(Testimony of Chauncey L. Berrien.)

on which there has been a slight deposit of cuprite; throughout the country rock east of this continental fault, there is a slight staining of copper silicate or chrysocolla; about fifteen feet west of the east face of tunnel 31, is a south cross-cut fifteen feet long in which there is a seam probably half an inch wide. It has no importance whatever in regard to the main facts shown in 31; I have indicated that seam on Complainant's 17 by a slight red line, and it crosses the cross-cut at right angles; the remainder of the material in that cross-cut is granite, stained with chrysocolla or copper silicate, and this seam crossing that cross-cut is one inch wide. The material between the large blue line, representing the continental fault and the fault plane near the face of the tunnel 31, in the tunnel itself, is granite not stained so much by chrysocolla as the granite in the south cross-cut near the face; this second vein is cut in the second north cross-cut, and has almost the same strike as the first vein. It might be the same vein. They might come together [1163] in depth or in strike easterly. The Rabbit discovery is east of tunnel No. 31; it is about twelve feet deep. In the west wall and at the bottom there is an excavation of about three feet long, in which is shown what appears to be to me a joint plane mineralized by a staining of chrysocolla; it is no more than an inch or two wide and does not show on the east side of the shaft; that is the only mineralization in this shaft. There is some aplite and some granite in the shaft after it reaches bedrock; there is no staining in the

(Testimony of Chauncey L. Berrien.)

country itself, but in this seam.

Shaft No. 3 on Complainant's Exhibit 14 and No. 9 on Defendants' Exhibit 1 is a vertical shaft about forty feet deep, probably seven feet by four; it might be larger; at a twenty-five foot depth, a cross-cut has been run north twelve or fourteen feet. In this cross-cut, four feet from the shaft, there is a wall or a slip with some green staining of chrysocolla along it; three or four feet north of that is another similar showing; the first one encountered dips eighty degrees to the north; the second one is vertical; they have a northwest course,—north eighty west. This might be termed a vein, although they are very small; what I term a wall is a slight deposit of clay, possibly, showing some movement along these walls, which is the staining. Beyond the vein and in between, rather beyond the second slip and in between these two slips or walls, the rock is granite; the bottom of the shaft, some of the ground north of the timbers was broken away, exposing on the west side a wall or plane of the continental fault; at a depth of fifteen feet on the east side of the shaft, the lagging has been removed, showing nothing but iron oxide stained granite. There is no vein showing in the east wall [1164] of the shaft. That is all that shows in these workings; the general mass of the material in shaft 9 and its connected workings is granite, and there is some slight iron oxide stains, but very little chrysocolla stain, except in these small slips, in the north cross-cut. Taking the course and the dip of the slips in the north cross-cut,

(Testimony of Chauncey L. Berrien.)

they would not intersect the shaft, unless it was in depth; the first dips eighty degrees to the south, the second one is vertical; it is hard to tell where they would intersect if they continued the dips given, because in the excavation or cave at the bottom of the shaft, these same showings are in evidence and they are no closer to the shaft than they are in the upper cross-cut; and from that, with reference to the dip exposed in the upper cross-cut, I would infer that it was more vertical than the south dip shown in the cross-cut; the dip has changed slightly in that distance. These walls appear in the cave about five feet down in shaft No. 3; there is probably three or four or five feet of granite right in the back, next to the shaft timbers, but as a matter of fact they are so slight that it is hard to recognize them. You have to be very careful in observing them to get their strike or dip, or anything; they are of very slight importance. I saw a plane or part of the continental fault on the west side, at the bottom of shaft 3 or 9; its course is slightly east of north; it is a part of the continental fault, though a smaller plane; the course of the continental fault will vary from twenty degrees west of north to twenty degrees east of north. I was not able to see the bedrock in the east side of shaft 3 or 9, where the lagging was taken away; I looked up under the lagging and I had an idea that I was not positive that bedrock was around thirteen feet, [1165] but I would not say positively; I could see about one foot back of the lagging. There was no vein in the shaft.

(Testimony of Chauncey L. Berrien.)

The next opening going east that I visited was the Vesuvius shaft and the workings from it. The Vesuvius shaft is east from No. 3 shaft; is forty-three feet deep, timbered and at the bottom a cross-cut extends north a distance of eighty-five feet, approximately. In this cross-cut, there is no vein whatever, merely joint planes and stained seams in the country rock, which is all granite; there is a very slight stain, scarcely recognizable in this north cross-cut,—a green chrysocolla stain. South of the shaft, a cross-cut extends twenty-five feet. In that distance there are two small seams, a half an inch wide, filled with iron oxide, and a slight staining of chrysocolla. They are not veins. At the point twenty-five feet south of the Vesuvius shaft, whoever ran this working, encountered a seam which I have marked four inches at its greatest width; they turned to the east on this and drifted about twenty-five feet; at that point, this four-inch seam spreads out into two or three seams; it is not of much importance that it does, or that it is there. From this drift a cross-cut has been run south sixteen feet, in which there is nothing but one joint mineralized slightly; through the workings south of the Vesuvius, the country rock is granite, stained slightly by copper silicate. This joint plane on which the drift is run, intersects other joint planes, which it encounters in its course east. That is all, I believe. The general mass of the country there is granite with a slight green staining,—it is very slightly apparent north of the shaft, but it is very apparent south; this

(Testimony of Chauncey L. Berrien.)

staining is not as great as the staining east of the continental fault in tunnel [1166] No. 31. I entered shaft No. 19. It is a shaft eighty-seven and a half feet deep. The wash appears at a depth of eighty feet on the east side and seventy-eight and a half feet on the west side, leaving six or seven feet in the bedrock. There are two prominent fault planes in the bottom of this shaft, one in the east side and one on the west side. They dip to the east and strike west of north. Between these two planes there is nothing but disintegrated granite. In the fault planes themselves are crushed material; the walls are very definite. There is nothing whatever having an east and west course in the bottom of this shaft. There is no mineralization whatever, excepting staining by iron oxide, and that is slight; the strike of those faults is probably north ten degrees west. There is no vein or vein structure visible in shaft 19.

I visited and took notes in tunnel 32, which is represented on Complainant's Exhibit 14, and as a tunnel two hundred and twenty feet long, from the place it enters the side of the hill, and thirty feet from the east breast, there is a large branch of the continental fault, which is five feet from foot to hanging and is really the largest and strongest showing of faulting on the placer in any of the openings. It has a strike of north and south; it is indicated in blue on the map referred to; the material of the bedrock is all granite, and between the walls or planes of the fault the material is this crushed granite;

(Testimony of Chauncey L. Berrien.)

there is not mineralization, but along the south side of the tunnel, east of the fault, there is a one-inch seam of iron oxide, visible for about fifteen feet along the strike. A seam might refer to a joint plane, as distinguished from a slip, and having no appreciable movement on it,—no apparent movement. It might be called a veinlet.

[1167] The next opening going east from shaft 19 is tunnel 35, which is one hundred and sixty feet long from the point where it first cuts the surface of the ground to the face. It is in wash except the east seven feet, and even the back of that seven feet is in wash. There is only two feet and a half of rock in place in the tunnel, and that is mostly aplite. Near the end, five feet west of the east face, is a cross-cut north for six or seven feet. This working shows no vein structure whatever. I would characterize the balance of the bedrock in so far as exposed as granite, and there is a slight discoloration by iron oxide.

The next opening is tunnel 36, which is represented on Complainant's Exhibit 14, directly east of tunnel 35; it extends into the hill easterly about one hundred and fifty feet. About one hundred feet in there is a tunnel, a branch of the tunnel extending easterly, in which there is nothing but granite, with the cleavage planes stained with iron oxide. There is also, from this hundred foot point, a cross-cut running north twenty feet, in which there is nothing but aplite and granite. From this last working, the tunnel runs easterly fifty-five feet; at a point thirty-five

(Testimony of Chauncey L. Berrien.)

feet along this tunnel, a cross-cut runs northeasterly for twenty-five feet. About six feet from the east face of the east and west portion of the working, there is a branch of the continental fault striking north three degrees east, and dipping eighty degrees to the west. Just west of the working, from this last mentioned working, there are two small planes of the continental fault movement. There are no veins in any part of this tunnel or its workings. The only geological features being the parts of the continental fault, some aplite and more granite that is [1168] slightly stained with iron. I saw no green stain of copper silicate in those workings. From the face of the tunnel, toward the mouth, in the first northerly cross-cut from the face, and back to where there is a fork in the tunnel, the general mass of the material is country rock,—aplite and granite. Those faults are indicated on Complainant's Exhibit 14 by blue lines.

Northeast of tunnel No. 36 is tunnel No. 37. The entrance to these workings is through a caved portion of the surface of the ground and is represented on Complainant's Exhibit 15 by the dotted circular marking, and these workings at this elevation are made in green. The portion of the workings extending almost easterly, contain aplite and granite. There are joints in the cleavage planes, slightly stained with iron oxide, but no green discoloration; there is a cross-cut north in 37, and this is mostly aplite, the rock through which it is run, and the northern portion of it, the northern half of it is

(Testimony of Chauncey L. Berrien.)

stained through the joint planes and the cleavage planes with chrysocolla. This working goes into a winze, evidently sunk to the bottom of the Mullins vein tunnel. The rock in that winze is granite, slightly stained with copper silicate and there are some showings of aplite in the winze itself; the back of this cross-cut is in wash. In fact the only portion that is in solid country rock is the lower foot or two, next the bottom of the working,—the cross-cut north from tunnel 37; there is, east of this north cross-cut, another cross-cut, which, being farther in the hill, opens up the bedrock and the country in the north cross-cut which does not show the bedrock, which would be the first ten feet of the north cross-cut; in that way a person is enabled to see all of the bedrock on the country [1169] exposed in these workings. In the last small cross-cut, which runs north, on Complainant's Exhibit 15, the mineralization is ap-
lite; there is green staining and a slight iron oxide staining. There is no vein or vein structure in these workings.

The Hornet tunnel, No. 34, is something over two hundred feet long. The first eighty feet is in the wash, and near the Gulf cross-cut in the back, we see the first showing of the Mullins vein. That Mullins tunnel discloses a vein, practically to the face, although near the face there is a faulting fourteen feet west of the east face, which displaces the vein just a few inches and throws the vein very close to the south side of the tunnel. You first encounter the vein in that tunnel about eighty feet in, on the north

(Testimony of Chauncey L. Berrien.)

side, and forty-five feet west of the Gulf cross-cut; it is not very easy to trace that vein as far west in the tunnel; as you come west from the Gulf cross-cut, there is no doubt of its being in the back of the tunnel for at least twenty feet. I have represented that vein on Complainant's Exhibit 15 in red. It is represented about breast high; all the strikes of veins or faults in these workings are taken at the point of a man's body, where he would naturally hold the compass; along this Mullins tunnel, there are three distinct fault slips, belonging to the continental fault; the greatest displacement being just opposite the Gulf cross-cut, and there the vein is thrown about four feet to the north, as you go east. The dip of this vein is sixty degrees to the south; the walls are very evident there, smooth and as well defined as any I have ever seen in Butte; at the point which is where the Mullins winze was sunk on the vein, you can see this wall very distinctly for fifteen or twenty feet down the winze. I did not go down the winze, because of its condition. [1170] The hanging-wall is exposed, and the foot, also, is very evident; the north side of the Mullins tunnel is all in country rock; the footwall is not very readily seen in the winze, but there is no doubt of its being there; the winze has probably broken into the footwall at that point; the winze itself is wider than the vein. The walls of this Mullins vein are clearly defined all of the distance from the Gulf cross-cut to the face, with the exception of probably four feet, as I stated before, directly east of the eastern fault slip in the

(Testimony of Chauncey L. Berrien.)

Mullins tunnel; the footwall is very evident in its position there, and the hanging-wall, you can pick into it and disclose the country rock on the other side; it is very evident that that is the extent of the vein, because of its width on the opposite side; the walls of the Mullins tunnel are to a great extent granite, but between the Gulf cross-cut and the Mullins winze you may see some aplite; the material constituting the vein is iron oxide, copper silicate, crushed granite which has been stained with chrysocolla, and chrysocolla itself; furthermore, there is some cuprite just east of the Gulf cross-cut and in the vein. At no other point, did I see any cuprite along that tunnel; this cuprite is very close to the fault, although it is possible to exist in the vein. From a geological standpoint, I impute the mineralization of this Mullins vein to ascending solutions and an enrichment by solutions oxidizing other portions, and causing a secondary enrichment, which is generally sulphides, of which there are no evidences in this vein at this elevation; the chrysocolla is derived from the alteration and precipitation therein of the granite, namely, the feldspars entirely feldspars which have been altered and forming kaolin and making a body which is very likely to receive [1171] the copper from the solutions they have been descending through the rock and the oxidized portion of the vein. I think the chrysocolla in the vein itself was formed by descending solutions, coming from the mass of the country rock and probably somewhat along the fault planes,—well, that would

(Testimony of Chauncey L. Berrien.)

be all of it; copper occurs in the country rock there as chalcopyrite in very minute particles that has been,—as the granite is altered, this chalcopyrite has been put into solution as a copper sulphate; in the alteration of the granite, silicic acid is formed, and uniting with these two, forms the copper silicate, through the altered feldspars of the granite.

In the Gulf cross-cut, there are two or three feet of country rock or bedrock above which the wash lies. There is a part of the Continental fault extending through the Gulf shaft and disappearing,—at least it is not visible. It may be traced on the bottom of the cross-cut, under the Gulf shaft. Along that there is a slight staining by chrysocolla; the whole west side of this cross-cut is granite stained with chrysocolla. About at a point next to the Hornet discovery shaft, there is a joint plane on which has been formed little nodules or kidneys of cuprite. By its appearance in the Hornet shaft, it is seen at a division line between the bedrock and the wash. It is very flat and occupies a position north of the Hornet shaft, along the very bottom of the Gulf cross-cut, and is visible for three or four feet. It is about one or two inches wide, this plane. Cuprite does not exist as a solid mineralization along it, but there may be an inch or two in one place on the plane itself, and in the next five or six inches there may be none. That is all that I could see in the Gulf cross-cut. This joint plane and its mineralization is observed on the northwest side of [1172] the Hornet discovery; it appears on the northeast side, but it does

(Testimony of Chauncey L. Berrien.)

not appear on the southwest side, because the wash comes in where the Gulf cross-cut meets the Hornet discovery shaft, and the dip of that bedrock gains a foot and a half towards the west. On the southeast side it appears that, and it is a fact to my observation, that the Hornet discovery was filled at one time and in the last cleaning out of this shaft, there has been left some of the old filling along the southeast side and no one is able to see the rock in place on the southeast side of the Hornet discovery. As you go into the Gulf cross-cut from the Hornet shaft, that mineralized joint plane disappears in the bottom west side of the Gulf cross-cut, it enters the floor; I do not observe it at all on the east side. There is a little inequality in the bottom of the Gulf cross-cut, and furthermore it is not very easy to trace these joint planes. I did not observe it on the east side of the Gulf cross-cut. The reason for that may be that it entered the floor of the cross-cut before I came to the east side; the Gulf cross-cut, going from the Hornet discovery to where it finally disappears from the walls on the west side and enters the floor in three or four feet. The faults marked on Complainant's Exhibit 15 in the Hornet tunnel are indicated in blue. I do not observe the fault indicated west of the Gulf crossing the north cross-cut toward the Hornet discovery shaft, because of the broken condition of the top of the bedrock and it is so small that it is impossible to locate it exactly. It is put in in a dotted line, because we could not observe its exact position. I only saw it in the tunnel proper, and I projected

(Testimony of Chauncey L. Berrien.)

it the balance of the way. In examining this Gulf cross-cut, the bottom was cleaned off. I cleaned it off with a shovel myself, and could trace [1173] it along the bottom. Farther than that, you can trace it down the winze to the lower workings on the Mullins vein. The fault was mineralized with chrysocolla and some cuprite; its width was two or three inches along the fault plane. The Hornet discovery shaft is all in wash above the point where the Gulf cross-cut enters it. At the bottom of this Gulf cross-cut, and in the Hornet shaft, there is this joint plane mineralized with chrysocolla and cuprite. This mineralization or joint plane, as I have said before, shows on the northwest side and on the northeast side; below that there is no mineralization, except a small green staining in the granite by chrysocolla. Seven feet from the bottom of the Hornet shaft, and showing on the southwest side, is another joint plane one inch wide, in which I could see no cuprite, but the chrysocolla was plainly to be seen. Then there was more of the chrysocolla in it than in the country rock itself. Down at the bottom, probably a foot from the bottom of the Hornet discovery, is another joint plane, probably a half an inch wide which is very slight and has a very slight deposition of mineral in it. Southwest from the bottom of the Hornet discovery shaft, is a working about ten feet long in which there is nothing but green-stained granite, but there is a very slight movement of the Continental fault shown in this working, and it is indicated in blue in that working. These measurements have

(Testimony of Chauncey L. Berrien.)

been taken from timbers which were thrown across the top of the Hornet shaft, and my depth for the Hornet shaft is thirty-seven and a half feet. I think that on account of the point from which these measurements were taken, that it increases this depth four feet from the original depth of the shaft as measured by the defendants. With reference to that southwesterly drift, it is about twelve feet [1174] from the bottom of the Hornet discovery shaft; the country rock is mineralized by a staining of chrysocolla,—the usual green color; the general mass of the material after you reach bedrock in the Hornet discovery and that southwest drift is granite stained with chrysocolla. Extending northeast from the bottom of the Hornet discovery, there is a working as shown on Complainant's Exhibit No. 16. It extends for twenty feet north of the Hornet discovery shaft, is entirely in granite, stained with chrysocolla. About four feet south from where this cross-cut meets the Mullins vein, there is a joint plane on which has been deposited some cuprite. This cuprite shows in the joint plane on the east side of this cross-cut, but is not apparent on the west side, although the joint plane is there. On the Mullins vein itself, in these lower workings, the vein is exposed, showing a width of three feet, possibly four and a half at its widest point; about five feet east of this cross-cut which cuts the Mullins vein is a wall of the continental fault, which may be observed extending up through the raise, or winze, whichever it might be, which connects with the Mullins tunnel.

(Testimony of Chauncey L. Berrien.)

There is a slight throw of the vein by this fault. The walls showing the lower workings are evident and show the same dip, sixty degrees, that is evident in the Mullins,—the upper Mullins tunnel. The mineralization of this vein itself is chrysocolla, limonite and iron oxide, and some cuprite. That vein in the drift under the Mullins tunnel, extends fifteen feet east of the winze, which is the end of the drift. This fault visible a few feet east of where the lower cross-cut intersects the vein is without doubt the same fault which runs through the Gulf cross-cut and apparently through the south side of the Gulf shaft; the general mass of the material in that [1175] lower cross-cut, running northerly from the Hornet shaft is granite stained with chrysocolla. The staining in that lower cross-cut by chrysocolla is not as great as in the upper cross-cut through the Gulf discovery; the main inference from that is that this staining was caused by descending solutions, and as depth was gained it would disappear in depth. Mr. Linforth and I together took Complainant's Exhibits 31 to 36 in the cross-cut from the Hornet tunnel to the Hornet shaft; I heard his statement of how they were taken and the points from whence they were taken, and the measurements, and his statements are correct; they represent all of the material in the cross-cut with this exception. They were taken to show that there was no vein present in that cross-cut, but there is a mineralizing by cuprite along this joint plane, and that mineralization by cuprite has no importance whatever in determining the presence of

(Testimony of Chauncey L. Berrien.)

the vein in the cross-cut. My idea of this sample in this cross-cut was that there was a vein supposed to exist in this cross-cut, of which the Mullins vein was the footwall. In sampling any vein, whether taking hand specimens or samples for assay, it is customary and the only correct way to take it, is by taking a piece from every portion through a continuous line from foot to hanging. This joint plane of cuprite, which had cuprite on it, had no more bearing on the vein than the mineralization along that part of the continental fault in the Gulf cross-cut. And had we taken any of the cuprite, it would not have been representative of any vein that is there, or any possibility to show any characteristic of a vein. Those exhibits and samples would demonstrate the average value of the whole body exposed; the samples and exhibits of Mr. Linforth fairly represent the general mass of the material from whence [1176] they were taken in those Hornet workings; the samples taken in the Hornet shaft were taken by Mr. Linforth and I together, and I heard his testimony with reference to the place where and how the samples which were assayed were taken, and I participated in the taking of them, and his statements were correct, but I might state that in listening to Mr. Linforth's testimony that it might seem we tried to make Mr. Watson's sampling seem unfair, but in that sample which we took as being No. 9, that was taken underneath Mr. Watson's sample. Mr. Watson had been there the day before, and it was apparent that someone had sampled along a joint plane, which is

(Testimony of Chauncey L. Berrien.)

seven feet up from the bottom of the Hornet shaft, and showing on the southwest side of the Hornet shaft, and his sample, I believe, ran nine and some tenths per cent copper. Our No. 9 sample was taken to show the condition in that shaft, across the southwest side, which would represent the values of a vein, if it existed in that shaft. But it was taken six inches underneath Mr. Watson's sample; it was taken approximately parallel with Mr. Watson's sample. The joint planes which presented the appearance of sampling at that point extended clear across the southwest side of the shaft; we took our sample No. 9 six inches underneath and across the full southwest side; that joint plane was one inch wide, and it was filled with chrysocolla; there was a part of the continental fault in the southwesterly drift from the bottom of the Hornet discovery shaft, about an inch wide, with a vertical dip. I distinguish between faults and slips; a fault movement is very extensive and slipping is very slight and occurs along the joint planes of country rock; a slip has no great extent in any direction; a fault may extend to any depth or to any distance along its strike.

[1177] I would like to state that I took no part in taking these first six samples which Mr. Linforth testified to; the others I did.

In Defendants' Exhibit 75, the pieces of rock are granite in which the feldspar is stained with chrysocolla; it is country rock, and would have no relation to a vein; the green staining is due to the alteration of the feldspar and later the staining by copper sili-

(Testimony of Chauncey L. Berrien.)

cate; the copper silicate came from the alteration of the particles of chalcopyrite in the country rock, and formed copper silicate with the silicic acid which is liberated in the alteration of the feldspars; the chrysocolla staining is probably of a later origin than the mineralization existing in the veins of Butte, and it could occur at the present time in Butte. I know the surface throughout the Butte and Boston placer may be observed as being very green; when I rode by on the street-car, I saw that; in fact, that was very noticeable to me before I ever heard of the Butte and Boston placer. Flowage of surface solutions are continually causing the green staining of the country rock, and it may be seen on mine dumps, in a small excavation down here in the pavement, lots of workings. All these different stainings, superficial stainings by copper solutions, are going on continually under different conditions.

Defendants' Exhibit 76 is a piece of country rock granite, unstained through the center, with a crust of copper sulphate on one side of it, which is from copper solution running over it and depositing it on the granite; I find no vein structure in those samples.

Defendants' Exhibit 94 is granite stained with copper silicate, similar to the staining in the Gulf cross-cut, with no [1178] vein structure; it could exist anywhere in the country rock, where those solutions were running through granite, which had had its feldspar altered and softened to receive it. I observed the excavation from which Mr. Barker produced Exhibit 94, which is in front of the Federal

(Testimony of Chauncey L. Berrien.)

Building; all the rock which was dug up from that repair work had a slight staining of chrysocolla in it, and I know that it is some distance from the outcropping of any vein; this excavation was not in any vein; I should think the chrysocolla in Exhibit 94 might be aided by the natural flowage of surface waters from higher up on the hill.

Defendants' Exhibit 56 is country rock granite, which is merging towards aplite. It is a little more silicious than the ordinary Butte granite, and being close to the wash, it has been opened up in its cleavage plains and given access to mineralization by iron oxide,—rather by iron oxides, because there is limonite and hematite both on this piece; this material was not very abundant in shaft No. 1; at the same time, there was all the seams, cleavage planes, and so forth, in that shaft were discolored with iron oxide.

Defendants' Exhibit 77 are small pieces, the main part of which is silicious granite and probably an occasional piece of aplite, and having seen this No. 1 quite a few times, I imagine it came from the north side of that shaft, for directly under the wash there are places where there has been a greater collection of limonite and hematite and you could get such a sample from No. 1; it occurred in the joints of the granite in shaft No. 1, and not as a vein.

Defendants' Exhibit 96, from shaft 21,—in all the pieces but one of this sample, there is no structure of the country [1179] rock remaining; it has probably come from the crushed material in between the fault planes of the continental fault, but there is one

(Testimony of Chauncey L. Berrien.)

piece which still retains more evidence of its granitic structure. All of the material is slightly stained with iron oxide; the agency that produced this has been the more ready access of surface effects, enabling the oxidation and weathering to get at it in this fault zone; the fault zone itself, having crushed the country rock, put it in a condition which would make it more readily altered.

Defendants' Exhibit 100, from shaft 19, is in such an altered state that it is very hard to tell what it is; that is evidently a piece of granite (referring to one piece of sample); and that is a little piece of granite (referring to another piece of sample); the rest of it is rather hard to tell what it is; I did not observe any material like that in shaft 19, with the exception of the granite, which is very readily observed, being disintegrated granite and not altered similar to this at all; this has probably fallen down, or been taken out from the wash; the general mass of the material exposed in bedrock of 19 is disintegrated granite; it has the feldspars softened after disintegration; it is what has heretofore been referred to as kaolinized. To the ordinary observer it might resemble fault material. The clay in the bottom of shaft 19 is in the fault planes themselves, and along the fault planes; in between these fault planes, the granite is almost in the same conditions that that sample that Mr. Barker brought in from the outside, with the exception that the feldspars are altered more and the granite itself is softer, but it still retains its texture; there is lots of this material similar to this

(Testimony of Chauncey L. Berrien.)

exhibit in the bottom of the shaft now, laying there as broken down [1180] material, broken from the sides of the shaft, about six feet at the bottom, is in bedrock; the shaft is not lagged very well, and this material has fallen down from behind the lagging; it evidently comes from the wash deposited on the bedrock. I observed no evidence of mineralization of the granite by replacement in the walls of the Hornet vein and in the material exposed in the cross-cut connected with the Hornet discovery shaft.

Cross-examination.

(By General NOLAN.)

The WITNESS.—I remember testifying to what I designate as vein structure; the materials that constitute the vein filling are sulphides and quartz in the sulphide zone; oxides and quartz in the oxidized zone; sulphide is mineralized, and an oxide is mineralized. I have known vein fillings where there was no mineralization at all; there must be vein fillings besides sulphides and oxides, and they are horses in the country rock,—fault material; whenever you encounter vein material that is not mineralized it is called a horse or a vein compound; if it is slightly mineralized but not sufficiently to become commercial ore, it might still be called a horse, or it might contain sulphide or oxide. I suppose everything in a vein within the walls would have some bearing on the vein structure; that is, they would each be a part of that vein structure; there may be granite in the vein, and there may be aplite in the fissure, if the vein passes through an aplite dyke, and there may be

(Testimony of Chauncey L. Berrien.)

granite in the fissure, without any mineralization at all, and there may be granite altered and mineralized, [1181] within the vein walls; and there may be, if the vein passes through an aplite dyke, in the case of a vein fissure, aplite in there, unmineralized and unaltered, and there may be aplite in there with the feldspar kaolinized and the rock mineralized; it is not an uncommon thing at all, where the vein runs through country rock, or through granite, to have granite as a portion of the vein filling; and so likewise, where a fissure runs through aplite, it is no uncommon thing to find aplite as a portion of the vein filling, and the granite in that case may be altered and mineralized, where you go through the granite and the aplite likewise may be altered and mineralized and it may not. When I am shown a piece of aplite and it is mineralized and altered, I can tell whether it is a portion of the vein filling or not, by the association of the different components of the rock itself, but I cannot always tell by the piece of rock itself that it is altered and mineralized and whether it came out of a fissure or not, and so likewise in the case of a piece of granite that is mineralized I cannot always tell whether it came out of a vein fissure or not. By replacement I mean alteration of the ferro-magnesian minerals and replacement by sulphides, inside the walls of the fissure; I don't know of any instance in this district, where this replacement has occurred outside of the walls of the fissure, and I have known of no instance where the replacement occurred except through ascending waters or vapors; I do not know

(Testimony of Chauncey L. Berrien.)

of any instance in Butte, in the mines here, where the material outside of the walls of a fissure have been mined and shipped as ore. The greatest width that I have known of material to be shipped out of fissures in Butte is a hundred and fifty feet, and I have known of material for that width [1182] to be shipped hundreds of feet, and fairly continuous throughout that distance. After that the fissure narrowed, took in horses of waste, throughout this distance of hundreds of feet, and tracing the lead up, one eastern portion of it diminishing to five or ten feet; different veins known as different veins, diminish westerly to fifteen or twenty feet; that is to say, in the easterly side, it finally got down to about ten or fifteen feet, and the entire distance, however, of a hundred and fifty feet in width was covered by a number of these leads parallel with each other, or fissures; you will find these conditions exist. In the eastern portion of it, it diminished to a width of fifteen feet, and I then said it resolved itself into a number of leads. There were three or four of those leads within that distance of a hundred and fifty feet, westerly, constituting but one fissure that was mined; I am speaking in particular of the Anaconda vein; the Anaconda vein in its westerly course, where it narrowed down, was not the same there as it was towards the east; it might be twenty or twenty-five feet wide, the widest portions through the Anaconda, the Saint Lawrence, the Never Sweat and the Mountain View; there were not a number of parallel leads as it progressed towards the west. I would not attribute this widen-

(Testimony of Chauncey L. Berrien.)

ing for this distance of two or three hundred feet to those three leads or four leads, converging as they came from the east, making this width of a hundred and fifty feet; I think it was formed by different series of breaks in the country rock, to give a chance for mineralization and replacement along the walls and also by faulting, which makes them appear as different leads, or it mostly is due to the fact that these breaks or fissures have had branches or extensions off from them, and then there has [1183] been a mineralization all along the east and west strike of those different breaks. The oldest system, or the oldest veins in Butte, are the east and west veins. The Anaconda vein is one of these, and the Syndicate vein in the Mountain Con is another. They do not hold their width all the way, but there are horses of waste in between them in one portion of the camp, and you have got to designate them as different veins. I think that the original fissure vein as wide as this excavation as now indicated, that there were breaks in the country rock through which these mineralizing solutions penetrated and effected the replacement of the material; the walls have been replaced and the vein has been enlarged by lateral replacement along the fissure; you still have the walls of the vein; that mineralization would not be beyond the walls; those walls include that mineralization. It was a fissure, evidently, enlarged through replacement of the material, but the replacement does not run off in the walls somewhere; it keeps taking up the rock on the sides of the original fissure. Now, be-

(Testimony of Chauncey L. Berrien.)

yond that mineralization you cannot carry the vein. The vein has its width from the mineralization along by the replacement of the mineralization of the original fissure; this replacement did not occur at the time of the mineralization or enrichment of the original vein fissure,—it was at the same time and later; we have the fissure in the first place bounded by those walls, and we have the mineralization of it, and later on we have this enrichment of material beyond the walls of the fissure extending at right angles to the walls, going back into the country rock; I know of instances where that occurred outside of this particular instance that I have referred to in the Anaconda mine; it occurred in a great many of the veins other [1184] than the fault veins; there is nothing in the appearance of the wall of the fissure where the enrichment takes place in that way, to suggest that it was the wall of the fissure; where there is a replacement of the country rock, you cannot tell where the wall of the fissure was, either accurately or approximately; he can tell the width of the fissure,—that is, the vein itself as it exists. If there is a fairly sudden change within a foot or two, you can generally, in Butte, tell where the limits of the vein are, although it may not have any definite walls; in taking notes in these mines, I have never been unable to tell, within a foot, of where the wall of any fissure was, I do not care what vein it was in Butte,—whether there is replacement or not, or fault veins or any veins; it depends on whether that fissure has had much lateral replacement or not, whether I can tell within a foot

(Testimony of Chauncey L. Berrien.)

as to where the wall was; if there has been lateral replacement, there is no definite foot and hanging wall, in regard to definite slips or walls, as you say, but there is a definiteness in the walls of the fissure itself; we get vein filling from this ascending solution, and enriched later by a secondary enrichment; these ascending solutions cope up from a depth; they increase the walls of the fissure,—the width of them,—the width of the fissure, but they cannot form definite walls, these solutions, because the only way you can get a definite wall is by the original fissure being filled and having no replacement outside of those original fissure walls, or by some movement, as in a fault vein; the material itself that fills the fissure comes up from below; it comes up in a soluble form, and as it gets up, by reason of deposition, or from some other causes, there is a solidification of it. In connection with the vein, you [1185] first have the fissure; you have to have the crack and a break, but there need not be any opening there, however; sometimes there is a plane there and by reason of the ascending solutions eating into the walls, you have a fissure created or widened; you can have a fissure, a true fissure, would exist as a fissure, or you can have a replacement vein which comes under the head of a fissure vein. The true fissure indicates more than a plane; I would not suppose that they could exist in a very unlimited width, because the condition of the earth's crust would not permit of that. The fact that an open fissure of any great width could not exist in the crust of the earth, considering all the pressure

(Testimony of Chauncey L. Berrien.)

that has constantly been on it,—these veins are probably enlarged, and there might one exist, I imagine, ten or fifteen feet. These fissures are caused by strains and stresses on the earth's crust on the country rock, and there may be a zone which is crushed with a lot of parallel breaks throughout that zone, and there will be an outside one, or rather there will be a north one and south one, if the vein was running east and west. Now, if there is no lateral replacement, the replacement filling of that fissure will probably come along in between that north and south break and mineralize the ground in between and replace the rock with ore. That is why it need not be an open fissure in the first place; it could be a filling or replacement of that series of breaks and no replacement, in which case that north and south wall would be definite fissure walls. There is not any particular direction in which the break in the earth's crust should run to cause a fissure, it may be east and west or north and south, but it has a general course, and there is not necessarily any particular period of time when this break should occur.

[1186] Vein fissures and fault fissures might occur from the same causes. In the formation of the veins it is not necessary that this fissure should exist for any time before it became filled with these ascending solutions; immediately after the fissure occurred, this material, whatever it was, might at once commence to ascend, so as to fill and mineralize. I have reached no conclusion as to the possible depth of the fissures in the Butte camp; as far as we know they have gone

(Testimony of Chauncey L. Berrien.)

down until,—we have not lost any in depth yet; some veins have lost mineralization in depth, but others are just as rich; there are veins in Butte that are just as rich at their greatest depth as others are near the top; in reference to this fissure formation and in reference to this vein mineralization, the depth may be almost limitless, going down to the center of the earth, and so likewise mineralization; I think they would probably exist until they got to a depth where the heat and pressure make it impossible for them to exist; you might get to a material that is liquid and very hot, but at the same time, not a liquid, but a condition where you could not have fissures existing, or cracks of any kind; these solutions ascending filled the fissure and they might replace the walls; these ascending solutions do not necessarily contain granite; they have ore-bearing solutions, probably; mineral waters cool when they get to a certain distance above the mass of rock which is hot, and when they commence to solidify so as to fill up this granite, and remain a portion of the crevice filling, they are known as ore, if it is rich enough, and going beyond what we generally characterize as ore, they are copper, iron, silver and most anything in the way of metal; I never found a vein where the entire filling was copper or entirely gold,—it [1187] is sulphides in the sulphide zone, and oxides in the oxidized zone; I never found where the entire material was silver and copper. The fillings are ore, and whatever the country rock the vein exists in, and in the ore itself you find quartz. The quartz comes up in a solvent condition and becomes

(Testimony of Chauncey L. Berrien.)

solidified in some portion of its march upward, and there is every metal that comes up. In Butte the material that comes up as the ascending solution to fill vein fissures that we now have in existence, is quartz and the copper ores and silver ores, or the metals which form these ores; I know only one instance in Butte where instead of the filling being quartz and the copper ores coming up in a solvent condition, we have the granite constituting the walls breaking down and filling the fissure space, and they are not veins; there is just one occurrence here in Butte which is known as breccia, and there are occurrences of those in which it is apparent that there were fissures filled with material of the country rock and particles of ore. Now, that may be of no importance, but that is one instance in which nobody has explained the cause satisfactorily. The particles of ore came from ascending solutions,—from some place else,—from veins, and came into the earlier veins from these ascending solutions. When I speak of ore, I do not always have reference to this material that is brought into existence through the action of these ascending solutions; if it is rich enough to ship at a profit, it is ore, and, in a general way, I designate the vein filling as ore. Geologists, speaking about the copper leads in Butte or in the Butte district, do not conclude that in every instance they exist by reason of these replacement processes that we have been talking about. I have read the folio, but have not seen that in it; it does not occur [1188] as replacement in some veins, but there are fault veins and there are fissure veins; of

(Testimony of Chauncey L. Berrien.)

course, a great,—I imagine that the greatest percentage of ore mined in Butte is from the replacement deposits; by replacement, I have reference to material not coming up through those ascending solutions, but the solutions themselves getting into the country rock and mineralizing the country rock, but they came up,—the solutions. There may be mineralization by descending solutions, which comes from the chalcopyrite that is in the granite; the balance comes from oxidized portions of the vein. Chrysocolla is not found in depth; I was speaking of the original sulphide content of the vein, which is broken down by oxidation, weathering and so forth, and carried down in the vein meeting the other solutions from below, or reprecipitating its content on the already existing sulphides, forming a secondary enrichment, which is common in Butte. The chrysocolla is formed only by shallow surface waters, which never reach any depth. In the case of the sulphide, having in mind a copper, you have the sulphur and the copper in chemical combination, and then there is an oxidation of that product in the vein itself, and then it carries the copper down in solutions of iron sulphate, copper sulphate,—until it meets these other sulphides, deposits the content of them by precipitation on the existing sulphides. There is a great extent of the lead material that has been subjected to that kind of a change, because you have got about six hundred feet of wash on the Pittsmont which must have come from somewhere in the surrounding country, and in the leads out there this chrysocolla exists, and has en-

(Testimony of Chauncey L. Berrien.)

riched the leads,—in the lead in the Mullins tunnel; in the cross-cut in the upper tunnel it exists as a stain; it depends on how rich the [1189] stain is whether you can turn it into copper, and furthermore, I do not believe that you could, because a staining similar to that could not be saved by concentration or any process that I know of. It could be smelted, of course, but it does not exist in sufficient quantities to pay for smelting, in my judgment. If chrysocolla existed in places to be ore, it could be turned into copper; I would require staining so that the percentage of copper in the rock mined would pay for all the costs of mining, smelting and shipping; the stain on the rock as it exists now could not be saved. You could save what copper content there is by smelting that rock. You could save the copper content of the entire mass of rock in Butte. I have known those faults and fault fissures to be mineralized by ascending solutions, just the same as the vein fissures; and I suppose there is a secondary enrichment in the faults similar to the veins by descending solutions, but I do not think any of them have been enriched by reason of the formation of this copper as we get it from the chalcopryite in the granite on the surface. I think the occurrence of copper would be slightly aided by this copper as chalcopryite in the granite through the process of erosion; if you had to depend for the enrichment exclusively upon the descending solutions, through the disintegration of the granite, I do not think you would have material enough to enrich the fissure. The enrichment of the country rock between

(Testimony of Chauncey L. Berrien.)

the Hornet discovery and the Mullins tunnel is due to the alteration of the feldspars and breaking up of the chalcopyrite, and the staining of that feldspar by the solutions,—the solutions all came from the top, going down, and the sulphates of copper came from the breaking up of the granite and so likewise this cuprite,—this copper oxide,—these kidneys, [1190] came from that source. I know that stain goes to a depth of forty feet, to a slight extent; I think that stain would be so faint at two hundred feet that you could not distinguish it, unless you had some other channel, other than the country rock,—that is, a channel such as the fault there would give; you don't have this staining in every instance because the chalcopyrite does not exist in an evenly distributed quantity, and because the distribution of waters through there, through their access to the rock, is not equal in all the area. I think you could find granite without any chalcopyrite at all; in the granite you have always quartz, feldspar and mica; you will find copper most in every metal somewhere in the earth's crust; since we know these ascending solutions brought up water and brought up copper, naturally then any igneous rock that was thrown up in the mass formed in the earth's crust, would naturally carry copper; it is very reasonable to suppose that all the original contents in the molten condition will exist in some degree or other in the solidified portions that make up the crust of the earth. You have to have copper in the rock, then you would have to have solutions getting into the rock, then you would have to have those solutions as

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salicic acid to deposit chrysocolla. You have got to have a lot of conditions. Now, it is not natural to suppose that all those ideal conditions can exist to form all these different compounds. Otherwise, you would expect the whole earth to be a vein. You can get chrysocolla in places, but not all over. In some instances we have granite as the country rock, with chalcopyrite, and in some instances, we have the granite as the country rock without any copper at all, or any chalcopyrite; you cannot find it distributed equally throughout all the [1191] granite. I know of no fault fissure in Butte where the mineralization is due exclusively to descending waters, but I have known of instances where, in the case of the fault fissure, and where, in the case of vein fissures, there has been increased enrichment of the contents by reason of descending waters. I have never engaged in prospecting, and never located any veins. By vein structure I mean the occurrence of the ore in the vein, and whatever other material may exist between the walls, the way it was formed; I have known of instances where a vein was barren; that would not cease to be a vein, because there was a disappearance of the mineral. The way in which it was formed as an element of the structure is the fact that we have just been talking about,—ascending and descending solutions and all those actions; I would say the material is brought up from below and deposited and enriched by other solutions; in the case of this replacement process, where you take the material of the country and enrich it, there is a changing of the structure of the

(Testimony of Chauncey L. Berrien.)

original material; the change need not be so thorough that you cannot recognize the original material at all; the change that must take place in order to constitute the replacement is that the ferro-magnesian minerals replaced by ore, in every case in which, if there is not entire replacement, you recognize the feldspars. In the case of granite, where that is the rock that is replaced the feldspar is sometimes eliminated; the dark minerals go first, through,—the ferro-magnesian minerals go first,—the hornblende and so forth, which would be the iron and the magnesia, and the micas, but you can get the whole mass replaced, of course. The magnesia exists in the granite in the formation of the granite, but not in a visible form, and you cannot see it in the granite [1192] after the change and distinguish it; there is absence of the ferro-magnesian minerals, hornblende, mica and so forth in this process of replacement; sometimes the quartz remains and sometimes it does not; its remaining or disappearance depends on whether there is thorough replacement or not; if there is a thorough replacement the quartz disappears; it is probably dissolved in the replacement and reprecipitated in a crystallized form; some of it exists in the form in which it exists in the granite; sometimes it changes the form which it has in the granite, and becomes quartz in some other form, and through different system of crystallization, and sometimes it is not replaced; to replace them, it has got to break them up and deposit the minerals in the place of those; there may be a partial replacement of the granite, but there is no partial replacement of the

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different materials which compose the granite; there is no particular standard of mineralization that must be reached before this replacement is effected; the amount of that replacement is governed by the ore and the disappearance of these minerals; as far as the extent of it is concerned, that would be determined by an assay. Where the replacement is, the physical appearance of the granite is changed; you have got to consider that if you can recognize the granite, that there cannot be any replacement; it is simply alteration; but when you get the replacement, then you distinguish that some parts of the granite are missing, and you tell that by the texture. I have not known of instances in Butte where the mineralization has been effected sufficiently so as to cause an alteration of the granite and not a replacement of it; in every instance in Butte, to my knowledge, where granite has been mineralized and so as to become ore, it was [1193] necessary that the process or replacement should be effected, rather than alternation. I have not known of any instances where a piece of granite was altered only by replacement, so that it would carry four or five per cent copper. There has to be a replacement; you cannot get enough mineral in the little crevices when there is no mineral removed; it is nothing but a solution could exist there, and still get the texture of the granite there removed, unless it was simply a staining. I would say the samples I obtained from the Hornet cross-cut would carry one and a half per cent copper.

Mineral veins are not exactly alike; they are differ-

(Testimony of Chauncey L. Berrien.)

ent in size and in material contents, in mineralization and in the degree of mineralization, and they have been known to be as narrow as an inch; they get quite narrow sometimes; but I never saw any very large veins *that down* to where the walls touch each other; and in the oxidized zone, sometimes you have in the lead itself or in the vein, the country rock altered. I think you could find instances where you could recognize the country rock in the oxidized portions, and sometimes in the oxidized zone where you have the country rock altered through mineralization, you can readily see the difference between that altered material and the country rock that is not altered, and whether it is or not, the miner, or I, as a prospector, am enabled to fix the boundary of the altered rock by reason of the physical characteristics observable in the difference between the altered country rock and the unaltered country rock. I would have no hesitancy in pronouncing exhibit 81 to be aplite unaltered; exhibit 80 is also aplite. Visual inspection would suggest some difference in the appearance of samples 81 and 80; 81 is regular in its composition, has but very slight iron stain. No. 80 is stained on the outer portions of it, possibly [1194] through that crack (indicating crack on sample) by iron oxide, and further than that it has a gradation from the aplite into almost pure silica; I could not say that the changed condition of 80 as compared with 81, is due entirely to exposure to the atmosphere; it is due entirely to its original formation; there is no difference in the alteration whatever in those two pieces of

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aplite. One, No. 80, simply has some iron oxide stainings along in the cracks, in the piece of rock; the iron oxide stainings did not originally exist; they came into existence after it was formed, and came into existence by the action of surface waters washing them in through the crevices; some of the surface waters might have been mineralized, some of them not; it all depends upon to what extent you carry the mineralization; iron came out of the aplite by reason of coming into contact with the water in it, carrying iron,—came from these waters washing over this surface of the aplite. I can see the feldspar in sample 81; there is no evidence in that sample of the kaolinization of the feldspar; I can also see the feldspar in sample 80; the content of the rock is the same as 81, with the iron oxides; in the case of sample 80 there is not any replacement of the original material at all; it is there intact; the iron oxide was caused by the weathering of the rock. Sample 79 is partly aplite, grading into silica; it is merely a form that the aplite will take through the mass of the aplite; there is that difference between that sample and sample 81 which shows the aplite grading down into pure silica; now, a short ways from this piece there might have been this same material of aplite similar to 81; you can see the aplite structure here; it grades into the quartz; it is not vein quartz at all; you can get that occurrence, similar to exhibit [1195] 79 throughout the aplite in many places; there is a staining by iron oxide in sample 79, and you find the feldspar unaltered where it has not graded into silica; the

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change was formed that way; feldspar and silica in the original formation are in sample 79; when the rock got as it is from the molten material, it formed and crystallized in that way, but it was stained with iron oxide; that is the only change at a later time; if the oxide stain got to sample 81, you would have the same material then as in the case of sample 79; I showed you a little place on the back where there is a slight oxide stain; that is the same staining that is in exhibit 79; the quartz is formed there in that aplite, graded from the aplite to quartz in its formation; I said that in some of these pieces of samples 79 and 81 there is very little normal aplite graded into quartz, but they were both formed by a molten magma, not by any vein formation, and the one has no more significance to me, found in a fissure, as to a vein, than the other.

The sample you now show me is unaltered granite; the quartz and the feldspar and the mica are all there, and it has suffered no alteration at all.

By General NOLAN.—Will you mark that?

The EXAMINER.—I will mark that Defendants' Exhibit No. 113.

General NOLAN.—We will offer it in evidence.

The WITNESS.—Complainant's Exhibit 35 is granite, and there is some difference in the appearance in the color between that sample Complainant's Exhibit 35 and Defendants' Exhibit 113. Complainant's Exhibit No. 35, the darker minerals are present; in the Defendants' Exhibit No. 113, they are present; in Complainant's Exhibit No. 35 the feldspars are

(Testimony of Chauncey L. Berrien.)

present, but are altered and stained with chrysocolla; in Defendants' Exhibit [1196] No. 113 the feldspars are present, hard and unaltered; in fact, a person looking at both samples together, can see exactly what has happened; that feldspar is soft; this hard,—the dark minerals are there just as abundant as they are in this unaltered granite; in the case of granite as vein matter,—and in the case of copper mineralization you have granite in all stages altered and unaltered, slightly replaced; I have not seen this material in Complainant's Exhibit 35 as vein matter, but if granite occurs as the vein material partly replaced, the dark minerals would be missing. We sometimes have granite as vein material, where the fissure goes through the granite, and sometimes we have the granite in a condition where a replacement has been effected, and sometimes we have the granite in a condition where it has been altered, and it is altered; you can find altered granite as a vein material.

Q. Well, will you kindly answer my question. This is altered granite. What is the use in quibbling about it? This is altered granite, isn't it?

By Mr. SHELTON.—We object to the question. This is a repetition of the question that was answered. The witness answered that he had never seen anything like that in vein material.

A. Well, material similar to exhibit 35 might be found in a vein. You can find any material in a vein, if it passes through that quality of country rock. That exhibit 35, coming in the Gulf cross-cut is altered, stained granite. At the same time, you could

(Testimony of Chauncey L. Berrien.)

get altered, stained granite within the walls of the vein.

The WITNESS.—Speaking of veins generally,—then, any vein which has two definite walls and a mineralization and [1197] oxidized zone passing through country where the general mass of it is a stained altered granite, then you have got to fix those limits in those walls themselves. A vein is designated and distinguished by the mass of country rock it is passing through. In the case of country rock where there is a fissure and we find this material in the fissure, there might be a mineral vein under certain conditions, but I would need quite a few more characteristics than that altered granite; it would need definite boundaries; it would have to have the dark minerals absent and replaced by some other minerals. In sample 35 we have the feldspars stained but not replaced; the feldspars remain in their fullness, suffering no change but an alteration,—softening and a staining; softening is a change but is not a replacement; it is necessary, in order to have vein matter, in my judgment, that the feldspars be replaced; in the case of sample 35 the copper gets into the feldspar by filling it just like it would a sponge,—just like water would fill a sponge. That staining runs through the feldspars, which have been softened; as an example, water, you know, will pass through a rock of this state of composition,—Defendants' Exhibit No. 113. The mineralization of the granite where the replacement takes place is not a very rapid process, and where the replacement is

(Testimony of Chauncey L. Berrien.)

entirely accomplished, it replaces the ferro-magnesian particles, a small bit at a time; you have to decompose or to soften the feldspar before the mineralizing process can become operative, to some extent, but the difference in these two is that the feldspar here is softened and stained, while in this, if that was changed to ore, the first stage of the feldspar would remain unaltered and the dark minerals would be replaced; by dark minerals I have reference [1198] to the mica and the hornblendes,—the ferro-magnesian minerals. Where I find a piece of granite in the process of replacement, where it is mineralized with copper, at no stage does it assume the shape of sample 35,—not with the feldspars softened and the dark minerals unchanged; in the gradual alteration that finally results in replacement, the dark minerals are replaced first and then the feldspars, if the complete replacement occurs. By dark materials I have reference to the ferro-magnesian minerals—mica and hornblendes; and generally in the process of replacement, the mica and the hornblendes are entirely replaced before the feldspar is affected at all. And in this instance, referring to sample No. 35, the mica and the hornblendes are intact, in my judgment, and there is simply a softening of the feldspar, and this mineralization does not get in and impregnate the feldspar at all in its softened condition; it simply stains it on the outside. In order to have vein matter, where you have the altered granite, it is not necessary to find there some material where the hornblendes and the mica displaced, where the feldspar,

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instead of being stained, is impregnated with the mineralizing agency. The whole blooming business may be replaced. You can have different stages of replacement, but in its preliminary stages of replacement, when the texture of the granite changes, the first minerals to disappear would be the ferro-magnesian minerals; that is why it is so easily recognizable that exhibit 35,—complainants,—has the original texture with the dark minerals present, and the feldspars altered,—that there has been no replacement whatever. If I found material like sample 35 and with some cuprite in nodules and bounded by material resembling sample 113, and this material sample 35 was in place, [1199] you would not pay any attention to it as suggesting a mineral vein. I would require a wall, some evidence of mineralization, replacement other than staining, not a deposit of small particles along joint planes; if in the oxidized zone, I would expect some honeycombed quartz and heavy staining by iron oxide; those are practically all the elements or all of the conditions that I would require. Referring to 113, presenting the physical appearance that it does, as compared to sample No. 35, I would not consider that that might be a wall, if there was a line of cleavage, because I would see the granite in its condition simply as an alteration and with no evidence of having any replacement deposit in it; I would not consider anything at all a mineral vein except that there were evidences such as I referred to that the mineralization was due to ascending vapors or waters; I would have to go some ways before I

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could decide those things definitely,—that is, go ahead with the development; under the peculiar conditions existing here, in order to have a mineral vein, there generally is a replacement, partial or total. I would not call sample 35 a replacement at all; there is an alteration there; the feldspars have been altered and have become softer. Defendants' Exhibit 35 is granite, chrysocolla and cuprite, and there may be replacement in some of it, and in others there is not; there is alteration there; the mica and the hornblende has probably been affected in some of it; you might find that material in a mineral vein; if I found it bounded by 113, which is this unaltered granite, it would not always suggest to me that I had a mineral vein; if I had ten feet of it bounded by 113, I imagine it might be from a vein, but these same occurrences might come along the joint plane bounded by practically [1200] unaltered granite; I said the mica and hornblende might be eliminated in some of it, although in other particles you cannot see the dark minerals, and original composition of the granite; this country rock is a joint plane,—they could occur in a vein; that is, an area in which the pieces of,—the particles of ferro-magnesian minerals might occur, if there had been another slight opening there which might have been filled with cuprite; it is not very easy to pick out these samples and describe them as to their occurrence, because you can get this material from the vein or you could get them in a small deposit in the joint planes of just this width; in the case of those samples there, where you have the mica and

(Testimony of Chauncey L. Berrien.)

the hornblende removed or supplanted, it was accomplished by replacement, and the replacement was effected through mineralizing agencies, but I cannot tell whether those mineralizing agencies represented ascending or descending solutions. If I found that material,—six inches of it, in what seemed to be a crevice bounded by country rock unaltered and unchanged, the country rock being granite, I would attach no significance to it that it was a mineral vein, if I saw it as I have seen it out here; if I was a prospector and did not know any better, I might be deceived in following a joint plane. I would say it was a joint plane by reason of the smallness and by the condition of the rock on either side of it, to indicate replacement or alteration. Defendants' Exhibit 38 is granite, aplite, chrysocolla and cuprite; I do not see any replacement in the case of the granite; there is softening and staining of the feldspar; there is softening and staining on the outer coating of the aplite; I would not say that it was through the mass; there is some aplite in that piece (referring to one piece of [1201] sample). The staining probably goes through the entire piece of rock that we are now examining,—I see it does on breaking the sample; the staining does not impregnate the entire mass of these pieces; the granite is altered, and in the sample we are now examining there is also some oxide of copper in one of the particles. If I found two or three inches of it near the surface, and bounded on either side by this granite as represented by sample 113, I would not attach any significance to it as a min-

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eral vein; I would imagine that it might be a joint plane, or it might be a slip, and if it were a joint plane, I would appreciate the fact that it would not have any great depth; the depth I would give it would depend on which way it was dipping, but not very great dip, probably,—I never followed one very far; I have no difficulty as a geologist in distinguishing a joint plane from a vein fissure,—it is by the occurrence of the rock alongside the joint planes or the fissures as to whether there is replacement; I am not sure whether you have replacement of the material in joint planes or not,—I would not say that you never do have any replacement along a joint plane; I have seen lots of joint planes a couple of inches wide; to a very limited extent I think that a slight replacement could occur along that; if I should encounter some material like this (exhibiting sample to witness) stained, with chrysocolla, in the Hornet Discovery shaft and also encounter that seam having cuprite, that would have no significance to me as suggesting a mineral vein. There are mineral veins upon this ground in controversy,—for instance, the vein in the Mullins tunnel, which is a true fissure vein, and also those two veins that appear in the cross-cut of tunnel 31, which are true fissure veins, and being true fissure veins, they are likely to go [1202] farther than the distance where they are visible; that is to say if I were to express a judgment in reference to the matter, I would say that this Mullins vein, in its course goes farther east and it might be interrupted by faults and also in its course farther west

(Testimony of Chauncey L. Berrien.)

it might be interrupted by faults, and, unless the faults throw it too far out of the way in its course westerly, it may go into the Pittsmont ground; and so, likewise, in reference to those two veins in tunnel 31,—or in the cross-cut,—they are likely to go a considerable distance west of there, and go as far possibly as the Pittsmont ground.

I have examined the Donner vein, and I think that vein goes into this ground in controversy, but I am not able to definitely establish any connection between it and these veins that are visible in the north cross-cut of tunnel 31; there is a chance for it to be one of those veins; in order to be one of these veins, the Donner vein in its easterly course beyond the point where it is now visible would have to suffer displacement by faults,—I know that it does suffer displacement beyond the point where it is exposed; it would be faulted by the faults in 21 shaft and by the small fault in No. 31 tunnel; I have a faulting of the Donner vein; they displace the Donner vein; I would figure that the Donner vein comes easterly as far as that fault is visible in shaft 21; there might be other faultings in between the Donner vein in the Pittsmont and that fault, and my judgment is that if it came as far east as that fault it would suffer displacement from that fault, and also if it came east of shaft 21 and as far east as those other openings where the faults are likewise disclosed, it would suffer displacement by those faults, but I could not tell how much of a displacement; it may be great and it may be little. There must [1203] be a displacement or there

(Testimony of Chauncey L. Berrien.)

would not be a fault, either up or down or laterally; it may occur so that the vein is continuous. That is a possibility, but it has got to be very exact conditions; the vein has got to stand up straight; the fault has got to be vertical; the movement has got to be down in a vertical plane.

Defendants' Exhibit 33 appears to be a very highly altered granite and chrysocolla; it is impossible to tell whether it has got into the condition that we call replacement, because this alteration might have occurred before the chrysocolla came there; it is really impossible to tell what it is; it has nothing but the structure there. If I found that in place, bounded by country rock, it would have no significance to me as vein material as I see it; I would like to look at it in its place; but I think it might possibly be,—it is a very poor sample to judge from; if I found it in a crevice or in a break in the country rock, and it has a course and it had a dip, it would not possess any significance to me; it might be a mineralization by staining along a joint, or it might be a staining of the country rock existing in a vein; it could be either one. I could see its occurrence in relation to other materials near it, and its width, and occurrence as to dip, and perhaps its extent. I told you it was very easy to locate the walls of a vein; I said there was sometimes difficulty in locating them to within a foot; most veins are very regular in their dip. In shaft No. 9 of yours and No. 3 on ours, it is hard to tell whether the dip of the vein changes, because in that cross-cut, while it is dipping slightly south, the only

(Testimony of Chauncey L. Berrien.)

place you can see it is in the back of the caved portion at the bottom, so that the only sight you have of it is a line coming [1204] down from above, but its distance from the shaft has not changed while it has descended from the cross-cut to the bottom of the shaft; I imagine this vein might have changed its dip at some portion of its descent into the earth; I know that it probably changed its dip slightly, but, as a matter of fact, it dips south eighty degrees in the cross-cut, and it appears to be vertical in the back, but I have said that I am not sure of it.

I have been constantly in attendance upon this trial, and have assisted materially in the progress of the trial, and have been offering suggestions to the attorneys for the complainant; I was asked to be here by Mr. Kemper in connection with my work out there, and everything connected with it, and I am paid like the other geologists in this case, twenty-five dollars a day.

Redirect Examination.

(By Judge BOURQUIN.)

The WITNESS.—I am not sure of the dip in the cross-cut in shaft 3 or 9, but in the caved portion below there is such an indefinite vein that you cannot follow it down the sides; you *mere* see it in the back. Now, you cannot tell how a vein dips if you just simply look at the bottom where it is coming down; it does not show in the sides of the cave; it is faulted on the east side; on the west side it is impossible to see it. The last exposure east on the Donner vein is probably three hundred feet west of the west bound-

(Testimony of Chauncey L. Berrien.)

ary of the Butte and Boston placer, and that was twelve hundred feet below the surface. My last examination of the Donner vein was in 1907, at which time I ascertained its dip and strike; the Donner vein in the Pittsmont [1205] is displaced, faulted in its course west by a zone made up of different fault planes of the Continental fault, which is sixty or seventy feet wide; the displacement there I imagine would amount to from ten to twenty feet, and it is thrown to the south. If the Donner vein was projected east to the Butte and Boston placer, taking into consideration its dip and its strike, this easterly exposure in the Pittsmont ground, and there were no faultings, it would intercept the Butte and Boston placer's west side line three hundred and ninety feet south of the northwest corner, which would be somewhere about where the red line occurs on Complainant's Exhibit 14, marked "C," on the west line of the Butte and Boston placer,—probably fifty feet south of the line "C," and if it continued in its course on eastward through the Butte and Boston placer, it would apparently pass fairly close to the point indicated fifty feet south of the line "C,"—probably north of 31,—I don't know; it is rather hard to guess,—having a course north about seventy-two east, three hundred feet west of the west line, and it would come fairly near to 31, but it is hard to pick out exactly. I know of four distinct, and possibly five, distinct fault planes between the east face of No. 31 and the west boundary of the Butte and Boston placer. If the Donner vein continued eastward through the

(Testimony of Chauncey L. Berrien.)

Butte and Boston placer, it would be intercepted by the faults referred to, and have a throw in that instance, displacement. Coming east I should consider the fault would be to the north, and that would keep throwing the vein north of tunnel 31; I think the fault exposed in tunnel 31 is to the left going east, and as you go west from tunnel 31, the effect on the vein in tunnel 31 would be to continually throw it further south; I think it would throw the vein [1206] south of where the Donner vein might intersect the west boundary of the Butte and Boston placer; if it retains its course that it has in 31, the vein in 31 tunnel would pass through the west boundary of the placer, at least two hundred feet south of the line "C," or point "C," on Complainant's Exhibit 14; I am giving that measurement, allowing for no faulting and a generally regular strike from its position in 31 as it goes west. There are four, or at least five faults between the east face of tunnel 31 and the west line of the placer. Now, if you speak of the occurrence of the vein in 31, you would have to eliminate the faults in 31; I know of three, and possibly four, faults west of the north cross-cut of tunnel 31, before you arrive at the west boundary of the Butte and Boston placer; one appears in tunnel No. 30, one appears in tunnel No. 32, one, constituting,—or two planes constituting the same fault, in No. 21 shaft; the other faulting is in No. 19, and from its course I would imagine that it would be west of shaft 21. There is no way in which I can determine whether there are any further faultings west of shafts

(Testimony of Chauncey L. Berrien.)

19 and 21 on the Butte and Boston placer, but it would be a fair supposition to say that there were other fault planes, because of their general occurrence from the east line of the B. and B. placer, and the fact that a thousand feet west of No. 19 shaft and in the Pitts-mont ground there is a fault zone sixty feet wide; there would undoubtedly be other faults, movements in sympathy with these movements between these two points; it is possible that fault planes may so far displace a vein as to destroy its continuity. There is no way of determining how far a vein, when you have it exposed at a particular point, may or may not continue on its strike in either direction from the exposure. [1207] I heard Mr. Barker testify with reference to the vein in tunnel 31 proceeding on a northwesterly course and then afterwards proceeding on to the Butte and Boston placer so that it would connect with the Donner vein; I think it is very improbable of the vein in 31 connecting with the Donner vein if it proceeded northwesterly from tunnel 31, from its exposure in tunnel 31.

I was shown Complainant's Exhibit 35, of the Hor-net workings. I find no abrupt change like Complainant's Exhibit 35 and Defendants' Exhibit 113 in the Butte district, or similar to that condition. Furthermore, Defendants' Exhibit 113 is not common through the district, nor is it common on the Butte and Boston placer. The granite is broken down and more altered; it is softer than this exhibit 113, and where there is an alteration it will grade gradually from the slightly altered into the altered

(Testimony of Chauncey L. Berrien.)

granite and exist in that way. I have observed faults on the Butte and Boston placer that were mineralized; there is a mineralization along several different fault planes of the Continental fault, through the workings; I observed some in tunnel No. 31, in the Gulf cross-cut, in the lower tunnel in the Mullins workings; those faults were mineralized by descending solutions entirely.

Recross-examination.

(By General NOLAN.)

The WITNESS.—In projecting the Donner vein into the ground in controversy and beyond the ground in controversy and so far easterly as tunnel 31, I said that without any displacements by faults, it would be in the neighborhood of tunnel 31, in its [1208] course westerly; that would be where there was not any movement by reason of any faults or any displacement by reason of any faults, and it would probably be somewhere in the neighborhood, if there were displacements. If I were to guess at it, with the present openings that are on the properties, I would guess that it is the Donner lead that is exposed in that tunnel. A man has got to suppose something when a vein is going in that direction, and that is as close as I could suppose, it being the only vein that is there. The course I give this land exposed in tunnel 31 does not vary more than five or six degrees from the course of the Donner lead, as it is encountered in the Pittsmont workings. In projecting this Bonner lead I brought it to the surface,

(Testimony of Chauncey L. Berrien.)

on a certain dip. I know the position, having had access to the maps of the Donner vein on the twelve hundred. The course of that vein on the twelve hundred is directly to the northwest corner of the Butte and Boston placer. I measured the distance it gained in dip from the twelve hundred of the Pitts-mont to the eight hundred of the Pitts-mont, multiplied that distance by two to get the dip from the eight under the surface, measured that distance along southerly to the northwest corner of the Butte and Boston placer; that was as good an average as a man could take on the vein, in my estimation. I learned that in the easterly portion of the Donner vein and in the higher levels, the vein has a tendency to become somewhat more vertical than it is at greater depth, and that for the uppermost hundred and forty feet there is only a dip of eight feet in that distance. In getting to the surface from that point the dip I adopted in my calculation was greater than that, but it might flatten [1209] out more and it might become vertical, so that there would not be any dip at all,—run right vertically to the surface; having in mind the faults that came under my observation there, and the fault or the dip of the faults and also the dip of the vein, there would be a throwing of the lead to the north, going east; direction of throw does not make faulting either reverse or normal; when the hanging-wall, or the portion of the vein lying on the footwall has moved downward there is a normal faulting or gravity fault there, the common occurrence; reverse faulting is the excep-

(Testimony of Chauncey L. Berrien.)

tion; I imagine that all the faulting on the Continental fault is normal.

Redirect Examination.

(By Judge BOURQUIN.)

The WITNESS.—My guess that the Donner vein may be the same vein as is in tunnel 31 is very far fetched. It would be almost impossible for the vein in tunnel 31 to intersect shaft No. 2 and shaft No. 1, considering the general strike of veins in Butte,—for this vein to turn northwest in such a short distance coming west. I observed that north of tunnel 31 there is a great deal of undeveloped ground, and northwesterly of the Butte and Boston placer, and southerly from tunnel 31, until you reach the Hornet tunnel, there is a good deal of undeveloped ground. The Donner vein might pass through either one of these places and I know nothing about it from the workings on the ground, all based on the supposition that it continues on its course that far; the faulting from the faulting of the vein in tunnel 31 to cause it to appear in shafts 1, 2 and 21 and tunnel 30, as you went west would be north as you went west, and the actual faulting that I have observed on the Butte and [1210] Boston placer would throw the Donner vein into the south going west.

Recross-examination.

(By General NOLAN.)

The WITNESS.—It is a guess as to whether or not the lead exposed in the cross-cut in tunnel 31 is the Donner lead, and I say that by reason of the fact that the lead is covered, and there is such a distance

(Testimony of Chauncey L. Berrien.)

between the two points; that lead if extended easterly into the ground in controversy, and beyond tunnel 31 may be in this covered ground to the south of tunnel 31; if that were so you would not necessarily be likely to encounter it in the openings in the Vesuvius. It might come up there, through there between 32 and 31, and might meet some of this faulting and be thrown up there,—that is one instance,—and have a chance to miss any of these workings. That might be a vertical throw instead of a lateral one that you would encounter as a result of that fault that I am now speaking of, but you can imagine what the result would be, whether the movement was vertical or not; if there was a vein straight up and the movement was vertical on the faulting, you would have very little displacement; if you take a vein, the more you incline it, the more separation there is going to be on either side of the fault. In tunnels 32, 36 and 31 you encounter this fault that has a movement or width of five feet, but not all five feet; the fault that had the width of five feet is in tunnel 32; I did not encounter that fault where any lead intersected it for the purpose of noticing its effect upon [1211] the lead; I could not see it meeting any vein and determine its throw.

(Signed by the witness before the Examiner on the 16th day of February, 1912.)

[Testimony of J. C. Feebles, for Plaintiff.]

[1212] J. C. FEEBLES, duly called and sworn as a witness on behalf of the complainant, testified as follows:

Direct Examination.

(By Judge BOURQUIN.)

The WITNESS.—My name is J. C. Feebles; I am an assayer and chemist, and have followed that occupation about fifteen years. I took a course in mining engineering and chemistry and allied studies at the Colorado School of Mines. I have followed this occupation in Denver, Pueblo, Colorado, and Helena and Butte, Montana; nine years in Butte. I am in the employ of the Anaconda Copper Mining Company, and came to Butte to enter their employ; my duties are determining values of metals and other constituents of ores and other products that they might want analyzed. I would think that I have become pretty familiar and thoroughly acquainted with the ores of the Butte district. I have a recollection the samples Mr. Linforth brought from the Butte and Boston placer. I recognize Complainant's exhibit 38; it represents certain assays, numbers 1, 2 and 3, B. and B.; I got those samples from M. Linforth, and I prepared them in the ordinary way and made careful assays as to their contents of copper and silver. To the best of my knowledge and belief the returns stated in connection with those samples upon exhibit 38 are correct.

I recognize Complainant's Exhibit 39, purporting to be an assay certificate for samples 4, 5 and 6 from

(Testimony of J. C. Feebles.)

Mr. Linforth, and signed by me. It represents assays on the samples delivered to me by Mr. Linforth which were marked 4, 5 and 6. I believe the returns upon Exhibit 39 to be correct.

[1213] The assay return, Complainant's Exhibit 40, marked B. and B., numbers 7, 8, 9, 10, 11, 12, 13, 14 and 15, per F.A.L., and that represents a certain batch of samples that were received from Mr. Sales' office through Mr. Linforth, which is designated there as the assay upon this date for the assays as given in this certificate, and they were assayed, and the returns are, to my belief, correct. I had the general supervision of all the work in making those returns; of course the work is not entirely done by me; in my office I have a number of men under me; on samples represented on 38, 39 and 40 I did principally the weighing of the buttons as showing the actual value; and my assistants do the preparing of the sample and weighing the sample and making a fusion of the sample, cupeling the buttons and all the routine work connected with the completion of an assay, and I, in the majority of the cases, weigh the resulting silver buttons; the amount of copper is generally run by another man. These samples and assays went through my office in the usual course, except that they were probably given a little more care than the usual samples; if Mr. Linforth, or any of them, mention the fact that the samples are for a special purpose and I generally give them more personal supervision, and I did so in this case. Mr. P. W. Sheehy, Mr. Charles A. Mack, Mr. August

(Testimony of J. C. Feebles.)

Grunert, Mr. Phil McDonald and Mr. Bernard McDonald are the assistants who had something to do with this set of samples represented by 38, 39 and 40; I suppose it would take all of them to know the correctness of these samples, for each one of them, as a rule, does a separate part of the work, and he would not know, of his own knowledge, whether the other man did his work properly or not, most likely. I am familiar with the granite rocks of the Butte district by reason of analyses and [1214] assays of them; I have made assays of them in a great many cases to determine whether they carry copper; the great majority of the granite country rock of the Butte District will carry small traces of copper; it is difficult to find a piece of country rock in the Butte district that would not contain a trace of copper.

Cross-examination.

(By General NOLAN.)

The WITNESS.—By a trace, I mean a little copper; on a certificate we mention a tract because the percentage is so small that you could not give a definite figure for the amount contained by the ordinary methods used in analysis; below a tenth of a per cent we could call a trace, in ordinary rock, unless we were specifically asked to make a more careful determination; of course, there are methods, you understand, by which we can determine the amounts of certain traces; if there is a sufficient quantity there we can do that, but it requires infinitely more labor than the ordinary methods used. You are to infer from what I said in regard to the country rock carrying

(Testimony of J. C. Feebles.)

values, that almost every sample of granite that can be picked up around the Butte District has a sufficient quantity of copper to be able to make a statement that the rock carries copper, without taking any particular precautions to find it. By any ordinary method we can make the statement that it carries copper; if there is a hundredth part of one per cent, there is a trace, and if there is a five hundredth part of one per cent, there is a trace, but that quantity would not be visible to the [1215] naked eye; there might be a trace of copper in the rock so small that we would not be able to find it by the ordinary methods and we might report that there was not any copper in that rock; if we used ordinary methods, we would; still, there might be a trace of copper in that rock, but if we reported that there is a trace of copper in the rock, we know that in that case there would be a larger amount of copper than in the former case, because there is enough to make the statement that there is copper in that rock without going to any particular pains to find it. I said, relying upon my experience, in the majority of cases all granite found in the Butte District carries at least a trace of copper; I did not say that I could take a piece of granite from the Butte District and look at it and tell you whether it carried copper, but if I assayed it, in the majority of cases I would find copper in it. Of course, I am speaking of a majority of the cases in which I made assays. I do not mean to say that there is copper in granite that I have never seen around the Butte District. In the cases where I did make an assay, I do not know how

(Testimony of J. C. Feebles.)

far removed from copper veins the granite was that I assayed. There were instances where I found more than a trace of copper in the granite I assayed; I make a great many assays for copper, and I cannot remember from one day to the other what they all run in copper; any quantity of copper less than a tenth of one per cent would be less than a value which could be reported upon in figures; any amount of copper that is less than can be reliably reported in figures would be called a trace, if the copper is seen to exist in the rock,—that is seen to exist in an amount too small to attach a figure to it. A trace is an amount that is too small to reasonably attach a figure to. You cannot hold a [1216] thing of that kind down to an absolute figure like that. Suppose it contained five one hundredths of one per cent in an amount of five hundred pounds. It would take an immense amount of time and an immense amount of labor to take that out of a few pounds; I simply meant to designate a large amount of ore, but that contains a very small amount of copper. If you got all the copper out of that ore you would have a considerable amount of copper in the end, and in a case of that kind you could say how much copper you had, probably, but taking a small amount of ore you would find practically no copper, and you would say it was a trace. We call it a trace when we cannot, with ordinary methods, determine the amount. In determining the percentage of copper it makes a difference whether the quantity is little or big. Let us suppose that is a little grain of sugar and it is in a pound of sand; let us suppose that

(Testimony of J. C. Feebles.)

one little grain of sugar is so small that if you take it out of that pound of sand you cannot identify it as sugar, but if you had fifty such grains altogether in one lump you could identify it as sugar. Supposing you had fifty pounds of sand, each one of those pounds containing one of these little grains of sugar, and you get them all out, get them together, and you identify that then as a definite amount of sugar, but from the one pound which we would take when we haven't got the fifty pounds, but just the same it is too small to weigh and consequently we would call it a trace of copper; now, do you get my meaning? Of course, I am endeavoring to find out the proportion of the sugar in the sand, where it is possible, but the man that brings us the sugar, if we cannot find out the proportion and he wants to know if there is any sugar in the sand, we tell him yes, there is a little, we found it, but we cannot [1217] weigh it. If we knew how much there was there, it would not be necessary to denote a trace. I have probably found granite where there was not even a trace of copper; I have made reports on samples where I would report no copper. We use one gram for the purpose of determining copper; the amount brought in for the purpose of making the sample may be an ounce and might be a hundred pounds. In the case of sample No. 7, for the purpose of making the silver I used the half of an assay ton, and for the purpose of making the copper assay I used one gram; I did not use all of the material in the case of 7 that was turned over to me, and did not in the case of the others. For the preparation of the sample

(Testimony of J. C. Feebles.)

I used the entire quantity brought in, and of this, if I was going to make a copper determination I would use one gram, and if I was going to make a silver determination I would use the half of an assay ton, and then I would say that the trace was in the gram that I assayed, or if there was a mentionable quantity, if there was a fraction of one per cent, I would say there was a fraction of one per cent in the gram; I guess I know as much about those samples as anybody else; my experience has been that every man that had anything to do with them did his duty, but sometimes I guess the best equipped men go wrong, and make mistakes. I cannot tell you absolutely that these fellows did not make mistakes in this instance in the performance of the particular portions of the work allotted to them; I am taking my chances there in testifying as I am; I supervised them as far as men are usually personally supervised under such conditions; they are working in the office under me, and in this work of assaying they get away from my eyesight, and they may be in different rooms from the room occupied by me during the time that these samples are [1218] going through the different processes, in order to get the assay. Besides weighing the buttons I oversaw the work to a certain extent pretty much all the way through. That is my name on that certificate of that bunch of assays, and I received them myself from Mr. Arthur Linforth, and I received those samples from Defendants' Exhibit 39 and 40 from Mr. Linforth, and also exhibit 38 from him, and

(Testimony of J. C. Feebles.)

I took them into the sample-room and had samples prepared from them; I did not do the work,—I instructed the proper parties to do the work; I turned the samples over to somebody else, and gave him directions to prepare the samples, and I was somewhere about the office while he was doing it; that work was done without my personal supervision. The next step was making an assay of the sample; I don't know now who did that. The samples were made where all the rest of the samples were made, in a place provided,—the man who prepared the samples took them there; he could have mixed them with other samples, so far as I can tell, and I could not tell whether he did it or not in finally getting hold of the returns and signing those certificates; in connection with a number of things done in making this assay, errors could be committed intentionally or unintentionally, without my knowledge, but I am giving my evidence here and I am signing these certificates under the assumption that they were not. Under the terms of my employment by the Anaconda Company I am at liberty to make assays on the outside and make charges for them, but I did not charge in this instance. If Mr. Linforth assigns any work to me I do it.

Redirect Examination.

(By Judge BOURQUIN.)

[1219] The WITNESS.—With reference to Defendants' Exhibit 113, if I wanted to specifically determine the amount of copper that material like it would carry per ton, I would use the ordinary method

(Testimony of J. C. Feebles.)

that we use, because if there was a quantity so small that the result could not be determined by the ordinary method, the probability, would be that it would be negligible, that is, it would not be of sufficient importance to go any further into the subject; if I were to determine specifically the amount of copper in material like exhibit 113, which is not commercial ore, how much it would carry per ton, I would not use the same method. In the case of a granite of that kind, on account of the extreme delicacy of the test, I would have to have,—to use methods by which we can determine the copper down to a part of one-millionth, and if we could not find the copper in that small percentage, it would be reasonable to say that there was no copper in it, but I do not think I could specifically determine the amount of copper per ton in a small percentage of copper material like that; I would probably require, maybe a hundred or two hundred pounds of material in order to arrive at that.

Recross-examination.

(By General NOLAN.)

The WITNESS.—In the case of getting a hundred or two hundred pounds of the material, contingencies would exist where I would assay the whole of that. Copper values might be contained in such values that we could extract it or concentrate it, as we [1220] call it, without using that whole amount of material. We might be able to separate it by physical means and by other means; I would take the two hundred pounds and use it as the basis of sample and reduce

(Testimony of J. C. Feebles.)

it, and then finally I would get the part that I assay; if you give us time and money enough to do so; of course such designations as that are merely theoretical; there is no practical value to be attached to the extraction of a small percentage of copper from two hundred pounds; you understand that, because it is unreasonable. The trace noted in the certificates is of sufficient magnitude for us to be sure that there is copper there; sometimes, when rock is turned over to me, and I assay it, instead of making a return on my certificate "trace of copper" I say "copper, one-tenth of one per cent."

Redirect Examination.

(By Judge BOURQUIN.)

The WITNESS.—The granite country rock of Butte may carry considerably more than a trace in many cases. I am afraid it would be almost impossible to give you some range of the values in copper carried, or quantities, because in certain conditions in near contact with veins the granite might become very strongly impregnated with copper, to such an extent that it would become commercial ore of definite value, and of course there is no definite range of quantities or values that could be stated in a case of that kind.

[1221] Recross-examination.

(By General NOLAN.)

The WITNESS.—Sometimes you find granite in close proximity to veins, where it does not lose its characteristics of granite to any great extent, and yet it is sufficiently copper mineralized so as to be ore,

(Testimony of J. C. Feebles.)

and shipped and treated as ore; if you find granite carrying three per cent copper, it could be treated as ore. I would not think to look at Defendants' Exhibit 113 that it would show copper contents of one per cent, but that is an exceptionally fine specimen of granite; I don't know just what kind of granite this is; I think it is probably similar to this granite, but I cannot determine offhand all the minerals that that piece of granite contains, and I cannot tell as to the mineral contents just what class of granite it is. In the case of the granite, the country rock granite, containing a copper content of one per cent, the copper appeared in the granite in an oxidized condition, and as a rule you could usually see some indications of copper from its color, without assaying.

Redirect Examination.

(By Judge BOURQUIN.)

The WITNESS.—When copper would be found in the Butte country granite it would usually be there as an infusion or a leaching in a soluble form in the crevices of the granite, deposited there.

[1222] Recross-examination.

(By General NOLAN.)

The WITNESS.—There would not be an alteration of the granite there necessarily or of the feldspar; it would be there simply as a secondary deposit; it would be deposited in the cracks and fissures of the granite; there are not cracks and fissures in every piece of granite, but there is always cracks and fissures between every two pieces; I have reference to before removal; in the instances where I found the

(Testimony of J. C. Feebles.)

copper in the granite, where no replacement had occurred, there were simply cracks and fissures where this deposit existed,—where it had been deposited by secondary action; it was simply found along the plane or crack of the fissure.

(Signed by the witness before examiner, February 17, 1912.)

[Testimony of Harry B. White, for Plaintiff.]

[1223] HARRY B. WHITE, duly called and sworn as a witness on behalf of the complainant, testified as follows:

Direct Examination.

(By Mr. SHELTON.)

The WITNESS.—My name is Harry B. White. I live in Butte, and came here in the fall of 1899. I am a miner, and have followed that occupation about nineteen years. I have worked as a common miner, and as a foreman, and have leased for a number of years; I generally follow leasing, and I have prospected considerable. I have followed mining in Butte, in Madison County, Montana, in Lemhi County, Idaho, and in San Miguel County, Colorado, and Ouray County, Colorado; in Butte I have worked in the Pennsylvania, Never Sweat, Speculator, Moonlight, Parnell, Michael Devitt, the Belmont mines; I do not remember any others. I have leased on mines in Butte or in its vicinity; I had a lease on the Corronna about a mile west of here; I also had one on the Ella on Washington street. I think I can ordinarily distinguish a vein. I made an examination of the ground, or some of it, lying to the east of the

(Testimony of Harry B. White.)

Pittsmont smelter; I was out there and took a look through three different places out there; I was there to-day. The ground referred to is represented on the map here which is marked Complainant's Exhibit No. 14; there are two shafts marked shafts 1 and 2, and a tunnel marked No. 34; we were in them to-day.

Shaft No. 1 is a hole about eighteen or twenty feet deep, and the formation is, generally speaking, of granite; there is several stratas of some kind of another rock there that I took to be country rock; there is no ore visible in it; there [1224] is no vein in there; we could not get down to the bottom of the shaft exactly; we got down to the snow in the bottom, like, on the walls it is nearly all granite; we could not see any of the bottom of the shaft; it is slacked off a little there, and naturally would be covered a little with the stuff from the sides; it is difficult to say how close to the bottom that is; it is this soft dirt in the bottom, and of course I assumed that there is very little of it there, but I would not say distinctly how deep it is. I examined the wall of the shaft as it was exposed there on all four sides, and I saw no indication of a vein. There is a stake at the shaft marked No. 1.

I was in shaft No. 2 also, which I think is about twenty feet easterly of shaft No. 1, and there is a stake there marked No. 2 shaft; I went down that shaft; I am not prepared to say how deep it was; they have torn the plank off there; there is some snow in there; it is not over fourteen feet, I should judge, but there is some snow in there; I went down

(Testimony of Harry B. White.)

as far as I could, and the walls are exposed and I examined them; we examined everything pretty carefully; there is granite there,—that is about all there is in there, and there is a rock there that I think belongs to the granite family, but there is no ore in the shaft; this rock which belongs to the granite family is lighter in appearance; there does not seem to be any mica in it; it is lighter than the ordinary granite; there is lots of rock like that, you will find here in leasing; I am not positive, but I think that is aplite. I did not see anything there that looked like a vein, just the stratifications in the earth, that is, of stratified rock. I examined the material that was thrown around No. 2, which is granite and this rock that I think is aplite. I do not think I saw any lead material thrown [1225] out on the surface around shaft No. 2, excepting something that might have been a little bit indefinite that you find in the first few feet going down. There might be lead material in the wash.

I also examined tunnel No. 34; we went in there with our candles, went in there to a cross-cut that turns to the right; of course that is all in wash. I am going easterly now. I should judge it is fifty or sixty feet from the portal of the tunnel to this cross-cut; the cross-cut runs a little bit west of south; in entering the tunnel, you turn to the right, to go into that, and swing back a little bit west of south; we first went into the drift on the west side; there is a vein starts there seemingly, and we went along and examined this ore, seemingly in place, from there

(Testimony of Harry B. White.)

on in east; I am talking now about right from this cross-cut on east in the tunnel. We examined that and passed on through there to an old inclined shaft; there is a little ore in there, seemingly, in place; there is a well defined hanging-wall, but as to the footwall that is an unknown quantity to tell much about it; the shaft goes down and uses the hanging-wall for a hanging, on the inclined shaft; the upper portion of the inclined shaft or wall of it, would be along the hanging-wall of the vein; seemingly it has been an incline, partly caved in. I looked down this inclined shaft, but we were not able to get down in that part of it; we took and throwed our lights down in the tunnel toward the face to look around, and could see the walls; I am now speaking of the inclined shaft, and the hanging-wall was nicely defined, and we dug into it and it is granite; you can see this hanging-wall in the tunnel for quite a ways; we went through this cross-cut to the south, to where there is a shaft, [1226] apparently, bulkheaded above it, and then we passed on to another shaft, and come down this shaft, and went back in under again, and went to those workings that are bearing off easterly. Its position in relation to the tunnel corresponds with the position of the Gulf discovery shaft as marked on the map Complainant's Exhibit No. 15; I went on clear through that cross-cut until I came to another shaft. It is all in granite and aplite going through this cross-cut in the Mullins tunnel, over to this shaft we call the Hornet shaft; I did not see any vein in there. The vein I saw come right

(Testimony of Harry B. White.)

out to that cross-cut, and then it is broken up; as you go past there you can see it, as you go beyond that, but it would take a great deal of depth to clearly define it; the last I saw of the vein is just as you turn in the cross-cut. I went down the Hornet shaft and examined it and the walls. The material in the walls is pretty badly broken up down there in places, but it seems to be ground up granite; there is no vein there that I could see. I don't know whether we went to the bottom of that shaft or not; we went down to the cross-cut that passes back in under it; I think that is the bottom; I saw nothing below; there is loose dirt in there, and I am not positive whether it is the bottom or not. I examined the walls around at the bottom of that shaft, and what we took for the bottom; granite is shown there, but I saw no vein. From the bottom of that shaft we passed back in under that small cross-cut that has been run there; we went in the cross-cut in a northeasterly direction, I think, and in passing through that cross-cut I examined the walls; in going in I examined the left hand side, which would be the northwesterly side; it is granite all the way in there until we came to where the drift,—or where the cross-cut turns into a drift, and there [1227] is a little vein matter there; then we passed on in an easterly direction along in there, and that vein that is above, seemingly comes in there again, and there is a little ore there; there is a drift there; that drift has been run on a vein; it has apparently been gouged in there; it is filled in there quite badly; we had to crawl in on our hands and knees; that vein

(Testimony of Harry B. White.)

matter was in the drift, and is undoubtedly the same vein that I spoke of as appearing above in the tunnel that I entered; there is a raise there; you can go right up the hanging-wall; it is perhaps ten or fifteen feet, perhaps fifteen. I went easterly to the end of the drift; there is a fine hanging-wall there all right enough, and there is ore deposited in it, ore seemingly in place. From my understanding there is no doubt about that being the hanging-wall of the vein; it is granite in the hanging-wall there, and you would naturally assume that that is the hanging-wall. There is one little place where there is staining in the lower cross-cut, but not such as would make it a vein; you can find that lots of places around here. We examined the upper cross-cut as we went through it to see whether there was any staining there, and we found very little staining, and simply granite up there and more or less shapen up; it is not very good in place; the lower cross-cut is much the solidest on account of the depth; you are attaining depth, and naturally when you come down it gets solid; the upper one as it starts out towards this Hornet shaft, is running out of the ground like; if it was continued out it would run to the surface; the ground on the surface slopes in a westerly direction; that cross-cut will eventually,—well, it slips this way,—the cross-cut is going in a southwesterly direction; you would eventually go to the surface; the upper cross-cut, as you go [1228] in, next to the Hornet shaft is not a great ways from bedrock.

(Testimony of Harry B. White.)

Cross-examination.

(By General NOLAN.)

The WITNESS.—I did not make an examination of the ground before to-day; I think I have been over the ground in years gone by, but this is the first time that I have gone there for the purpose of examining it; I went there at Mr Shelton's request; we aimed to take the eight o'clock car out, but I went out about half-past eight or nine, I think. Gus Flores went with me; Mr. Shelton did not seem to want to give us any idea at all any more than to go out there and get an intelligent idea as to what we thought of that vein, as to whether that was a vein or not in that tunnel, and further as to whether we thought that was a vein in No. 1 and 2 shafts. He just told us to go out and look at that tunnel and those shafts; he did not tell us which side he was on; he did not tell me what he wanted me to testify to. I am working in the Moonlight at the present time, only I am lame and I have not been working for a few days. Gus Flores made an examination the same as I did. Mr. Shelton sent for me, a week ago Wednesday night, and I was up in his office to-day, and I was there last night; last night is the first time I went up there to his office. I have not testified in other cases for Mr. Shelton; this is the first time I had anything to do with him; Flores went up with me to his office last night,—we went together; Flores and I were alone when we made the examination. What I call a vein is a body of ore or gangue between two defined walls,—two walls, but I would not re-

(Testimony of Harry B. White.)

quire it to have two walls before I would say it was a vein; in prospecting [1229] the Government does not require but one. I have heard of instances where locations are made even without finding one, and satisfying yourself that the rock is mineralized. I have heard of it down in Nevada.

By Mr. SHELTON.—One of the assistants of Mr. Feebles is here now, and we would like to interrupt the proceedings to put him on, unless you are willing to stipulate as to what he will testify.

By General NOLAN.—Well, I guess I have no objection to that.

By Mr. SHELTON.—Let the record show that it is stipulated between the parties that all of the assistants of Mr. Feebles who took part in the analysis or assay of the samples as to which Mr. Feebles testified, appeared and testified that as to the part of such assay performed by each of them, the work was done correctly, and that the samples were treated in the usual manner and with the customary care, and that the samples so far as each of the work of the assistants is concerned was correctly handled in order to make a correct determination of the substance as to which a test was made, and that the correct results were correctly reported as shown on the assay certificates, which were introduced in evidence.

By the EXAMINER.—Colonel, you have heard that stipulation and you agree to it going into the record?

By General NOLAN.—That is all right.

The WITNESS.—I do not require that the vein

(Testimony of Harry B. White.)

should have any particular width to be a vein. There is no particular material that must be in a vein in order to make it a vein, so long as it is of vein matter. Of course, if it is filled in with some country rock or something, it would not be a vein; if the vein filling is not country rock mineralized, it would be a [1230] vein if it was not country rock, and the filling is mineralized. We get ore and talc and other gangue of one kind and another where the fissure goes through granite; ore is a kind of a rock; our silver ores here usually run petty high in silica, silver and iron; where they are oxidized it is oxide of iron and silica. There is such material as gangue in a lead, or in a vein. Gangue is the filling of a vein, and sometimes it is talc. I cannot think of any place in Butte where the filling of a vein is granite that has been altered and mineralized. In all the cases I have known the filling has not necessarily been ore; there is one kind of gangue,—sometimes there is long distances between,—between ore chutes that there is talc and porphyry, in some instances. I have heard of instances and seen some where there was granite where an alteration had taken place so as to carry four or five per cent copper, but I don't know how high it runs; I could see there was copper in it. From a miner's standpoint Defendants' Exhibit 38 is ore; a miner would call that ore; no matter what the geologists say I would call that ore; there is one little bunch of that material in the lower cross-cut of the Hornet discovery, on the left hand side coming out; if that material was in a fissure, I

(Testimony of Harry B. White.)

would call that a lead; if I found this material in place and on either side of it the material bounding it was not mineralized at all, I would call that bounding material the walls of this stuff as it was in place; sometimes in a vein you find vein filling that is not mineralized to any extent at all, or not mineralized like that, and sometimes you have difficulty in determining whether the material carries any mineral at all, except oxide of iron, in veins near the surface. Defendants' Exhibit 35, loosely speaking, if this is a silicate of copper, it would [1231] be termed ore,—I have reference to this green stuff; if the staining is silicate of copper from the standpoint of a miner, it would be ore if it had any commercial value,—if that is copper in there; I would have no hesitancy in saying that was ore, and if I found that in an excavation, I would call that a lead, and would locate it as a lead. I do not think we found any material like that in the upper cross-cut from the Hornet discovery shaft to the Mullins tunnel; if I had I would have a different opinion of the character of the material in that upper cross-cut; if I found a large amount of that I would think I had some ore; I would take it down and get out a sample and see if it had any commercial value, and of course if it did, I would go on; as a miner, I do not insist upon having the material in the oxidized region furnish a commercial value before I make a location of the ground. If I found this material there in place, and that it would not pay expenses of operating, yet showed copper of one or two per cent, I think you

(Testimony of Harry B. White.)

would have to consider that vein matter; but it may have leached there, but from my standpoint, of course, it would be vein matter, as a miner.

Defendants' Exhibit No. 37 is not broke open so a man can see inside; I don't think I ever saw that in a vein; I think you find that in the wash; I think a miner would term it porphyry; when a miner finds porphyry in a fissure he is encouraged to go ahead; this piece shows oxide of iron; this has undoubtedly suffered alteration; it shows that oxidized condition there. I presume you find material like this in some of the veins here; you take it in the silver veins usually along the side of the ore you find some of that; I am not familiar enough with the oxidized zone in copper to know whether [1232] you find it there. If there is enough copper in it to make it of any value, Defendants' Exhibit 36 is ore; it seems to be a country rock in some decomposed state, where the copper has passed into it; from my standpoint it is ore; anything is ore with a miner that has got commercial values in it; that is found underground. You do not always find commercial ore in a vein.

Q. And supposing that in this instance, and referring to sample 36, it did not have what you call commercial value, that is, value enough to pay the expenses of operating the property, but still did carry a value,—copper value,—it would not cease to be a vein, would it, because it did not have the commercial value?

A. Well, it might be a deposit of some kind. It would not necessarily be a vein.

(Testimony of Harry B. White.)

Q. Well, what would it be then?

By Mr. SHELTON.—We object to that. He has just said it would be a deposit. The question is a repetition.

Q. A deposit,—is that the only characterization that you would give it?

A. I think that would be sufficient.

Q. And as a deposit, could it be locatable as a vein, in your judgment?

By Mr. SHELTON.—We object to that. That calls for a legal conclusion. The witness is not qualified as a legal expert. He has not undertaken to say that he can tell us what may be legally located as a vein.

A. Well, if I found any of that, I would take a shot at it anyhow, and if I got throwed off it would be all right.

[1233] The WITNESS.—In ninety-nine cases out of a hundred in the location of mines in the first place, you don't find commercial ore to commence with.

Q. And if, as a matter of fact, you apply the test to a vein that you are applying here, you have got to get commercial ore in the first place, there would not be any vein at all from that standpoint?

By Mr. SHELTON.—We object to that as assuming something not stated by the witness. The witness has not stated that commercial ore is necessary before a location could be made.

(Question read.)

(Testimony of Harry B. White.)

Don't you know that there would not be any vein at all?

A. In a good many cases there would not, that is true.

Q. That is to say, there would not be any vein to locate, because you would not get ore of commercial value to start with?

By Mr. SHELTON.—We object to this. The witness has not said that it is necessary that there should be commercial ore in order that there be a vein.

A. Well, I do not think it is necessary, certainly, that it has to be commercial ore to stake a claim, because, as you have said yourself a half a dozen times, there would not be scarcely any locations made in country, if that was the case.

The WITNESS.—In order to have a vein it is not necessary to have commercial ore; there is lots of veins out here in the country that carried only two or three dollars, but they are veins anyhow. I judge sample 36 to be ore, if there is copper there.

In the case of veins in the oxidized zone, the material is different from the material that you find in the same veins [1234] in the sulphide zone, and sometimes, in the case of copper veins in the oxidized zone you do not find the evidence of mineralization as clearly as you do in the sulphide zone; in some instances in the sulphide zone, in the case of a copper vein, and especially near the surface of the bedrock, you simply find material iron stained,—in some places close to the bedrock you do not find much copper,—and possibly sometimes the copper,—traces of

(Testimony of Harry B. White.)

copper, traces of silver and traces of gold; and these metals existing in the gangue or in the rock, do not show themselves to the naked eye,—their presence there is only detected or disclosed through an assay in some cases; generally speaking, the iron staining is very plain; the prospector to determine that that appearance will lead to commercial ore will have it assayed to begin with, and *if shows* some traces, naturally he will keep on digging.

I have seen places where there was tons of material like Defendants' Exhibit 112, that did not amount to much; in some instances it would and some it might not; it would depend on the position. There seems to be some erosion or something like that, on Defendants' 30; the first thing a prospector would do would be to break that in two; I cannot tell what that is myself; it would be the worst kind of a guess; if it were broken in two it might lead you to do some work. If I found material like Defendants' Exhibit 77 in place, I would take it to an assayer; I would put a stake on it and hold it temporarily, so that the other fellow would not come in. If it showed a favorable amount of copper to suit me, I would be disposed to prosecute some work on it to see if I would not get material more richly dowered with copper in depth. It is material that in some cases right around here you find in leads [1235] near the surface. As I say, if I found that out here in a vein and the ground was vacant, I would take it and have it assayed, and if it showed a valuable amount of copper or any other mineral, I would put

(Testimony of Harry B. White.)

a stake on it, certainly, and I would do that because, in my judgment, it was a lead; in prospecting fellows do not assume much any other way; if he finds a little bunch of ore that way and it is between two natural defined walls, he assumes it is a lead; if it is just throwed around on the hillside, I would consider it float. It is very difficult to say about that rock whether it was originally granite or aplite or porphyry.

I scarcely think I would consider Defendants' Exhibit 57 suitable to locate, this scarcely seems to me to be quartz, although there is considerable silica in it, and it might come under the head of aplite; I am not positive, though. I am referring to the two larger pieces of that sample; there is considerable silica in there, which is quartz. I would take that and have it sampled, and I would put a stake on it. If it was a little kidney, I don't think I would locate it, but of course, if it was a continuous strata and had the appearance of being a vein, I would put a stake on it. In the work of locating a claim, I do not uncover the claim the whole fifteen hundred feet, but I spoke of it as a small kidney a foot long or two feet long and digging down found no continuous strata,—I would not bother with it, but if there was any values in it I would do more work on it. I would expect something on the surface to encourage a man; supposing you went down there and run into one or two ton of one per cent copper,—for anything like that I do not think I would go very far; you can find places in Mad-

(Testimony of Harry B. White.)

ison County where you can find copper of [1236] that kind, stains, and that is all you can ever get. I have known of instances, too, where there was simply that percentage of copper in the material near the surface and later developments brought into existence valuable copper mines; it might not look good to me but it might to some other man. I found some material that greatly resembles exhibit 57 in the shaft No. 2 when I made the examination there yesterday morning,—I mean these two dark stained pieces of ore; I did not find any like that, but I found some greatly resembling the two larger pieces. I did not see anything like Defendants' Exhibit 77 in shaft No. 1; there may be something like it up next to the wash; I did not see anything in place like that, and when I told you that there was not any lead there I had in mind its location as not containing any material like this in place.

From a miner's standpoint Defendants' Exhibit 36 would be ore; I do not know whether it would be good enough to ship or not, but I would call that ore.

Defendants' Exhibit 31 appears to be a piece of country rock straight,—the larger piece; this seems to be some kind of a quartz; it would depend on the conditions I found it in; if I found it in the country rock I might open it up a little to see whether it would make anything or not, and I would do that because the material I am referring to is material that you find in leads; these two pieces are lead matter,—this has the appearance of being lead; this is probably vein matter; the larger piece has the ap-

(Testimony of Harry B. White.)

pearance of country rock; I am not positive about the aplite; that is something that I am not very familiar with; as country rock that appears to have suffered a change; there seems to be some kind of a stain on the outside here; it seems to have oxide of iron on it.

[1237] There is evidence here that this piece has been subjected to some influences that have brought about an alteration of some kind,—that looks like surface rock; you can find it all over the surface everywhere, that has a great deal the same appearance. Country rock is not always the same; oxide of iron, however, makes nearly the same color, or a great deal the same, and in this instance there is oxide of iron,—I think it was probably iron in solution, but this is matter that came there in a liquid state; if I found this in a fissure or in a vein, stained as it is, between walls, I would call it vein matter.

I would call Defendants' Exhibit 27 ore, and if I found that in place bounded by the country rock and it was continuous, I would have no hesitancy about locating that kind of a lead; I have seen ore like this little brown chunk as big as my thumb over there in Madison County, and we followed it along in and thought we would find gold ore, and we never found anything. I did not see any material like that in the Hornet discovery shaft; if it was a continuous strata, and I found it in there, that would be a vein; by a continuous strata, I would simply require it to exist, but not beyond the limits of the opening, and that is what I mean by a continuous opening; I

(Testimony of Harry B. White.)

would simply proceed upon the assumption that it was likely to continue, and govern myself accordingly; that is the way all prospectors do; they go down a shaft and find it runs across their shaft, and they think it must be a strata of some kind.

I would call Defendants' Exhibit 29 ore, and there is a little strata of that in the bottom cross-cut from the Hornet discovery running northeast, as you come out of the drift and turn out of the cross-cut; it is on the left-hand side. To the [1238] best of my recollection, it is several feet out from what I would term the vein. It reminded me of what I saw in Madison County; I did not make the location in Madison County, but the fellow who did had a gold vein, and as you went in there on the left-hand side this was gold there and he broke in and he found these chunks of copper ore, but of course they were of no value. He showed them to everybody, and they were very high grade copper. In shafts No. 1 and No 2 there is some foreign material that came down a little like the slack off of a shaft; and shaft No. 1 had the appearance that there were a couple of stratas there; the general run of the rock there is granite, and this is not granite; it is a lighter colored rock and lays in the form of a strata through it; there is granite on either side. I know what a dip is, and the strata in shaft No. 1 stands nearly perpendicular, to the best of my recollection; in shaft No. 2 it does not seem to come to the surface there, to the best of my recollection; it comes in on the east side of the shaft there; to the best of my recollection

(Testimony of Harry B. White.)

it runs nearer north and south than east and west; I believe it goes into the northwest corner and cuts seemingly across, but nearly to the southeasterly corner it is pretty hard to judge for a man just going down there once in the shaft; I don't know just how shaft No. 2 stands out there, but it seems to run kind of diagonally across the shaft from the northwest corner to the southeast; this strata seems larger here than it does in the other; there are two in No. 1 and one in No. 2. The examination I made of the Hornet shaft would be the shaft in this tunnel No. 34,—south of tunnel 34, where I got to it going through the cross-cut; I cannot say that I noticed in the upper cross-cut where it left in the shaft, and on the westerly side down close [1239] to the bottom, any strata of copper oxide,—it is covered over somewhat from dirt slacking off on the sides, and I would not be able to say what it is.

Redirect Examination.

(By MR. SHELTON.)

THE WITNESS.—By the oxidized zone of the vein I mean from where the sulphide begins to the surface, usually it is right about at permanent water level,—generally slightly below. The bottom of the oxidized zone is usually a little above the permanent water level. The difference in the character of the ores in a vein above and below the permanent water level, is that one is termed a sulphide ore, that is, below the permanent water level, and the other is termed by miners free milling. I worked

(Testimony of Harry B. White.)

on court work in the Michael Devitt, and we did not get anything to amount to anything until we got down to the permanent water level, which was copper; sometimes the gold is a little higher in the sulphide west of here than it is in the oxide; in some cases there is gold in the sulphide zone, but it is not in proportion to the way it is below it. In the case of copper veins the values are below generally, water level; I do not think the same rule holds true in the gold veins, or as to gold values, only to a certain extent; usually an oxide ore over here contains less gold than the sulphide does in the same vein as you attain depth. There are cases here where, in the sulphide, the silver is good, and as quick as you come into the zinc zone it loses its values. I presume iron rust is some sort of an iron oxide; the yellowish or reddish stain that occurs on the granite in the granite cracks around on the [1240] surface of bedrock every place is called by miners oxide of iron. Sample No. 77 has the appearance of oxide of iron all around on the outside. If I were told that this material came from shaft No. 1, and that it came from the little crack having the width of an inch or so right up near the surface of the granite bedrock, it would depend on the condition it was found in, whether I would call that material a vein; if it was found in a little kidney, or something like that, I would not call it a vein; in shaft No. 1 I did not see anything in that place that looked like a vein; if I found material like that in a crack in the granite it would depend on whether it was continuous or not,

(Testimony of Harry B. White.)

whether I would call that crack a vein. There are lots of cracks occurring in the granite near the surface of bedrock over in that country, and in nearly all cases there is iron oxide,—that stain which miners assume is iron oxide; I would not locate those cracks as a prospector; if I found this material on the table in place where it occurs, if I have a chance to open it up and get a good look at it, I think I could tell whether it is a vein. I did not see anything resembling this sample 77 in the bottom or in the walls of shaft No. 1 that was exposed. I did not see anything like Defendants' Exhibit No. 30 in shaft No. 1; it is pretty hard for a man to tell what the staining is on the outside of that rock; the only way you can tell whether it is stained granite or vein material is to break it open and see what the rock looks like on the inside; it might be iron stain on the outside, possibly some of it is here, but you have got to have a fresh surface. I saw a strata in shaft No. 1, but not a vein, merely a stratification of country rock; a strata does not in all cases mean a vein the way I understand it. A true fissure vein is given as a vein [1241] that runs through country rock; it cuts everything; it has mineral in some cases, ore in others, gangue in others, between two walls. The strata I saw in No. 1 is merely a strata in the country rock. As I understand, a dyke is a crevice in the earth filled from an upheaval, usually composed of porphyry. I know of dykes in this vicinity; they flow from nearly all sides of the Big Butte, particularly in a southerly direction here. If I found this

(Testimony of Harry B. White.)

whitish rock that has been referred to as aplite with the granite on either side of it, but the two rocks frozen together, I would not call the part occupied by the aplite a fissure; I don't know whether it would apply to a dyke or not. The whitish rock I saw in shaft No. 2 was country rock. I could not tell whether material like Defendants' No. 30 was vein matter without seeing the place that it came from; I would have to see the surroundings; usually there is something in the surroundings that would indicate to me as a miner whether it was a vein or not. I could not tell much about the material in Defendants' 31 without seeing the place that it came from; if that is close to the surface, and all the rock out there really has that color on it, that iron oxide color, it is rather an indefinite proposition. The larger of the three pieces you hand me has the whitish colored rock I speak of, and I saw material like that in shaft No. 2,—that strata that I spoke of there.

Q. Would you as a prospector locate any material like this larger piece of these, if it occurred with such surroundings as you saw in shaft No. 2?

By General NOLAN.—Object to that as not re-direct examination. The witness went into that fully on direct. He told us that he did not see anything in the faces of this shaft that he would [1242] locate. Nothing can be accomplished by traversing that ground again.

By Mr. SHELTON.—He was not asked about sample 30 on his direct examination. He was asked about sample 30 on his cross-examination.

(Testimony of Harry B. White.)

By General NOLAN.—But practically he said that there was not any lead there.

By Mr. SHELTON.—Then you showed him the material up here on the table and asked him if that came from the vein.

By General NOLAN.—That is very true. I am not objecting to your examination of him as to the sample. As a matter of fact he examined the place he saw this, and he said there was not any vein.

By Mr. SHELTON.—This came from that place, and I am simply putting it in the place that it came from and putting the same question that you put to him.

A. I would not locate it.

The WITNESS.—I could not tell concerning these other two pieces whether I would locate the ground from which that was taken unless I saw the place that it came from,—I do not think that is any account to amount to anything; if I went and looked at it I might feel different about it, but seeing it here, I would not give ten cents a carload for it.

Referring to sample No. 29, that is ore from a miner's standpoint; I can tell that from looking at it; by ore I mean any mineralized rock that has commercial value, without regard to quantity; in looking at ore you assume it a certain value, if you had a ton of it there. If I found a sample in the lower cross-cut of tunnel 34 as large as this Defendants' Exhibit No. 29 on the table, that would be ore; it might be just a kidney or a [1243] kidneys there. It would have no commercial value if it existed there in a

(Testimony of Harry B. White.)

chunk as large as a man's head, in the kind of rock I saw in the lower cross-cut from tunnel No. 34. I spoke of a little strata which was on the left-hand side coming from the drift into the cross-cut,—it is in the cross-cut; there is a little strata running into the drift itself, just two or three feet after you go out of this cross-cut, I think, and that connects with the vein itself. The width of that opening running into the hanging-wall might be eight or ten inches, perhaps; I found that going into the hanging-wall of the lower drift, and to the best of my knowledge it runs south, I think, a little westerly,—a little bit southwesterly; it is pretty difficult for a man to say without a compass, and we did not have any. As you go into the cross-cut and pass from the cross-cut *and pass from the cross-cut* into the drift, you turn right around to your right in the hanging-wall about two feet from the cross-cut to the best of my recollection; I found one seam or strata in the cross-cut itself.

Samples 27 and 36 are ore, as a miner looks at it, but this silicate of copper, which I take it to be, this is ore.

Q. If you found bodies,—small bodies of ore in the country rock, that you found in those two cross-cuts and in the Hornet shaft, would you say that that was a vein?

By General NOLAN.—Object to that as repetition. He has told us repeatedly that really in reference to everyone of these, he has told us what the vein is, and if he tells us it is a kidney he would pass it up as no

(Testimony of Harry B. White.)

good. Now, what is the use of asking him that in reference to everyone of these.

Mr. SHELTON.—Well, you took them separately and asked him whether or not, if he had granite on each side, whether it was a vein.

[1244] A. It appeared to me to be a kidney in there and I would have to have more enlightenment before I could say it was or was not a vein.

The WITNESS.—I am somewhat familiar with the ground in controversy, and there are some features peculiar about it; you can ship the country rock out there in some places and get returns from it,—you could when copper was high, and when it is low it is of no value; there is oxide of iron on the granite bedrock out there, and also in places there is lots of this green staining,—the green staining that you find on the face of this rock there (indicating sample), and there are cracks on the rock out there, and this green stain gets into those surface cracks.

(Signed by witness before Examiner, February 19, 1912.)

[Testimony of Dennis Kennedy, for Plaintiff.]

[1245] DENNIS KENNEDY, duly called and sworn as a witness on behalf of the complainant, testified as follows:

Direct Examination.

(By Mr. SHELTON.)

The WITNESS.—My name is Dennis Kennedy; occupation, mine foreman; I have followed mining about thirty-six years; I have mined in Vermont,

(Testimony of Dennis Kennedy.)

Michigan, New Jersey, here, Colorado, Utah; I live in Butte and have for twenty-two years, during which time I have mined here on and off; I have been foreman in the Anaconda, Never Sweat, St. Lawrence, Emma; I started as a miner and worked as such for about six years, and about a year as a shift boss, and have been a foreman about seventeen years.

I made an examination of the shafts and some of the openings on the ground in controversy in this case, or near the ground in controversy,—there is a number 1 and 2 shaft out there and I believe the Hornet, and the tunnel,—the tunnel connecting with the Hornet shaft, No. 34. I made the examination yesterday afternoon. Shaft No. 1 looks like altered rock and granite, decomposed granite. I went over the sides as close as I could, to the bottom; there was a little dirt in the bottom that fell down in there; I went down in the shaft; I did not discover a vein there, or anything that looked like a vein. I examined shaft No. 2 in the same way; I went down in it, and found principally rotten granite; there is a little hard ground there, what I would call hard ground, looked like a boulder, large boulder, very badly broken up; what I seen is a little mixed quartz and granite, what the Cornishmen call bastard quartz, not very good. I did not find any vein there; bastard [1246] quartz is what they call aplite. The miners usually term country rock vein material, and that is country rock; vein material is quartz; I did not find anything there that I would call a vein, and I did not find anything in either of the shafts 1 or 2

(Testimony of Dennis Kennedy.)

that I would locate as a prospector or miner. I went in through tunnel No. 34, that connects with the Hornet shaft,—it runs a little north of east; I did not notice particularly how far I went in the tunnel in an easterly direction, but probably a hundred and eighty feet, and I examined where they had worked out what I considered the ledge, looked like a ledge to me, and really is a ledge or vein fissure; I found a vein in this tunnel, and it is disclosed in openings connected with the tunnel,—there is one,—two,—one at the inclined shaft there at the head, and the east end of it, and then there is a little cross-cut running south to the southwest, I should judge, to the Hornet shaft, I believe; I discovered the hanging-wall of the vein, on the south side of the vein; it is in the hanging side of the inclined shaft, footwall side of the,—about thirty feet, I should judge, from the other shaft,—the Hornet, I believe you call it, thirty feet north of that. I just looked down to the water in the incline shaft, what I could see there; I could see the hanging there plain. It looks as if it was a good strong hanging-wall, that is, I would consider it to be all right to work on, locate; it is what I would call a well-defined hanging-wall; there was sixty or seventy feet of it there, I should think, that is, in length east and west; I went through the cross-cut that runs to the south from this tunnel, twenty-eight or thirty feet, into the other shaft, the Hornet shaft; that cross-cut is run through granite; I did not see anything else there; I would say it was country rock. I went [1247] down the shaft, and I made an examination

(Testimony of Dennis Kennedy.)

of the walls of the shaft; it is sunk in more or less decomposed granite; I saw no vein showing in that shaft; I went to the bottom of the shaft; from the bottom of the shaft I went northeast to the vein or ledge here again; I probably went twenty-three or four feet, maybe twenty-five feet north or northeasterly in that lower cross-cut before I encountered the vein again; the lower cross-cut is in granite, and in the end of the cross-cut I found the walls looking good,—the hanging-wall,—the footwall side was broken, of course, making room to go through there they broke the footwall up, making it a little wider than the vein is; we went through a cross-cut and a drift there; there is a drift on the left on the vein; that is the same ledge I spoke of as showing above in the tunnel, the dip of which I should think is sixty-five to the south, between sixty and seventy.

Cross-examination.

(By General NOLAN.)

The WITNESS.—I was first requested to examine this property night before last, Mr. Shelton phoned for me to come down; he was the first person that spoke to me about going out to examine the property; I did work for Mr. Shelton once before, down in the South Butte here; I had a talk with him before I made this examination, yesterday afternoon, about half-past one, and I went down there about two o'clock; I went down there with a man I was introduced to, but don't recall his name; he went out there to show me the place, and he went around with me to the different places I examined,—went into the shafts

